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Growing Millets In Queensland

By J. HART,
Senior Adviser in Agriculture.

THE term "millet" embraces a number of small-seeded, summer-growing grain and grazing crops. ("Broom millet," a member of the sorghum family, is not included in this group).

Although the various millets belong to different botanical species their field behaviour is similar. They are fast growing. They are relatively free from insect troubles and grow on a wide range of soils. They present few production problems.

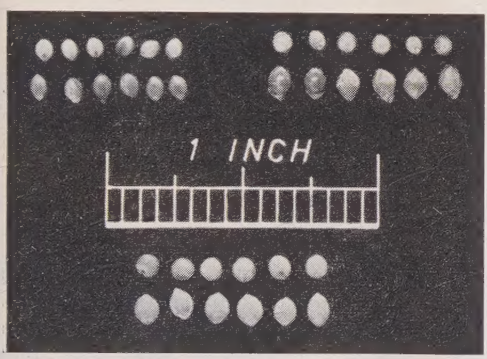

Plate 1.
Seeds of Three Common Millet Types. Top left, Setaria; top right, Japanese Millet; bottom, White French Millet. The lower row of seed in each group is complete with hulls; the upper row is dehulled seed.

The grazing millets are used extensively in dairying districts where they take second place only to Sudan grass as a summer fodder crop. Although some types exhibit a preference for certain districts, all can be grown successfully from the Atherton Tablelands to the southern border. On the other hand, production of the grain types is restricted to the central and southern Queensland grain belts. This limitation is due largely to the fact that farms in these areas are geared mechanically to handle such crops.

The millet grain market, both home and abroad, is very unstable. Moreover, as the relatively restricted bird seed trade provides the main market for the grain, the demand is limited.

Classification of Millets.—Millets are known by many and various names. Unfortunately, the one botanical species of millet may be known under a dozen different names in different parts of the world.

The purpose of Table 1. is to list the main types of millet grown (or likely to be grown) in Queensland and to give the common or vernacular names, which are officially accepted for each type. Some other common names for the same millets are given in the final column.

The variety of French millet commonly grown in Queensland has a creamy-white seed and is called White French millet. Similary the setarias locally grown have cream or straw-coloured seeds. In both these groups of millets, different seed colours may be found. Thus some overseas varieties of setaria may be black or red; similarly, reddish, grey and black seed types are commonly found in French millet.

Where and How to Sow.—All millets, whether for grain or grazing, receive similar field treatment.

Millets have a relatively low moisture requirement. Experience on the Darling Downs, however, would indicate that it is very difficult to grow

TABLE 1.

Botanical Name.	Accepted Common Name.	Other Common Names.
Grazing Type —		
Echinochloa crusgalli var. *edulis* ..	White Panicum	..
Echinochloa crusgalli var. *frumentacea*	Japanese Millet	Barnyard Millet
Grain Types—		
Panicum miliaceum	French Millet ..	Millet panic ; Proso. Hog or Broom-corn Millet ; Italian, Foxtail, Hungarian or Siberian Millet " Panicum ".
Setaria italica (dwarf)	Dwarf Setaria ..	..
Setaria italica var. *purpurea*	Korean Setaria	..
Dual Purpose Types—		
Setaria italica (giant)	Giant Setaria ..	Italian, Foxtail, Hungarian or Siberian Millet ; " Panicum "
Miscellaneous Types—		
Setaria italica var.	Nunbank Setaria	..
Pennisetum typhoideum	Bulrush Millet	Pearl, Indian or Horse Millet

a successful crop on stored moisture alone. To obtain maximum production, at least two "timed" rains are desirable; one after germination to encourage secondary root development, and the other at the crop heading stage. Accordingly, the mid to late summer sowing is often the most successful.

Nevertheless all members of the millet group can be sown any time during the September-February period —depending on local frost conditions. Though seedlings can withstand quite heavy frosts, extreme losses may result from severe cold and so out of season sowings should not be considered.

Sowing rate varies with seed size (Plate 1) and soil type. The following suggested drilling rates are based on seed size only. Any variations necessitated through soil type (remembering that light sandy loams can be sown 2–3 lb. per acre lighter than the heavy clay soils) are left for adjustment by growers with their intimate knowledge of local soil types.

On the heavy soils, millets can be difficult to germinate.

—	Lb. per Acre on Medium Loams.
White French Millet	9–10
Japanese Millet	8
White Panicum	7
Setaria (Giant, Dwarf and Korean vars.)	5–6

Sowing should be as shallow as individual soil types allow and should never exceed 3 in. Don't rush a millet sowing. Over-moist seed beds, once disturbed, dry rapidly. Poor germinations invariably result. It is better to err by planting on a dry seedbed rather than on a wet seedbed if uncertain about the ideal sowing time.

In soil types presenting germination difficulties, rolling is desirable. Rolling not only brings seed in close contact with the moist soil but also reduces aeration and subsequent drying of the surface soil. This latter effect is important on heavy soils because the longer this surface layer of moisture can be retained the greater the chances of spontaneous secondary root development.

Rolling also may help to limit losses caused by seed harvesting ants.

Spray with Hormone Herbicides.—The millets often grow so rapidly that they are untroubled by weed competition. However, if necessary, millet can be sprayed with hormone preparations at strengths of up to ½ lb. acid equivalent per acre.

The following procedures should be adopted:—

1. Use M.C.P.A. (Methoxone or Tuloxone). It is the safest hormone to use with this crop.

2. Apply no more than ½ lb. M.C.P.A. per acre (equivalent to 1 gal. of Methoxone or Tuloxone to 6 acres of crop).

3. Spray only when the crop has stooled and is at least 6 in. high. Never spray once the heads start to form in the sheath.

4. If "hard to kill" weeds require treatment, spraying with double strength M.C.P.A. can be carried out, but only after the millet has been closely grazed. If ungrazed, some crop loss may result.

Fertilizing Might Pay?—No worthwhile response to fertilizers can be expected on the bulk of our grain-growing land. In the case of grazing millets, however, and especially in the less fertile regions, trial applications of nitrogenous fertilizers may prove their worth.

Nitrogen as a plant food is mainly responsible for the promotion of leaf growth. Therefore, where ample moisture is available applications of nitrogen could increase not only the amount of foliage on any one grazing, but also the number of grazings obtainable.

Advice from your local agricultural officer could be sought on this matter.

A trial strip-application of one cwt. of sulphate of ammonia on one acre would cost £1 17s. (1958 Brisbane price).

The Grazing Millets.—Both White Panicum and Japanese Millet afford excellent grazing. Occasionally they are treated as dual purpose crops, in which case about 30 bushels per acre of grain is considered a good yield. As the seed has no commercial use other than as sowing material, the trade in these grains is small.

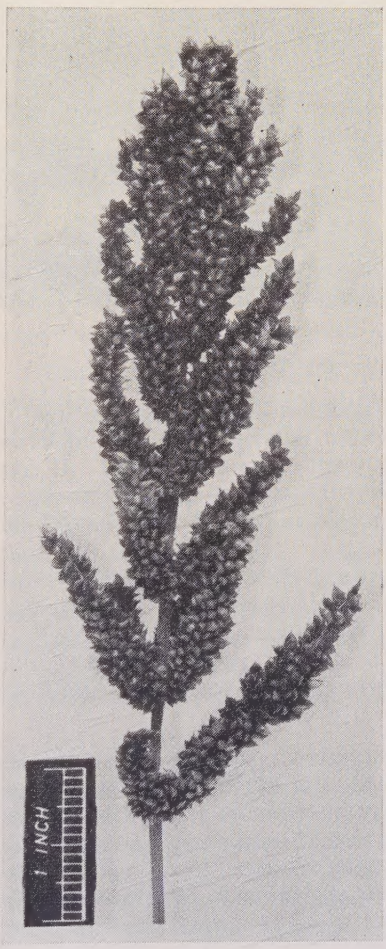

Plate 2.

A Head of White Panicum, the Favoured Grazing Millet for Higher Rainfall Areas.

Botanically, these two millets are very closely related.

Neither White Panicum nor Japanese Millet is poisonous at any stage.

White Panicum.—White panicum (Plate 2) is the more prized of the two grazing millets. However, it is less hardy than Japanese Millet and is more favoured in coastal rather than inland districts.

White Panicum has a semi-prostrate growth habit. In light stands especially, this characteristic is marked. This readily distinguishes it from other millets, all of which have an upright habit. Plant stems though coarse in appearance, are relished by stock. The seed is creamy grey and decidedly lighter in colour than Japanese Millet seed.

Seed crops of White Panicum are relatively slow to mature. They generally take two to three weeks longer than Japanese Millet.

Japanese Millet.—In the grain-growing districts Japanese Millet is the popular grazing millet. It has finer, though not necessarily more palatable, leaves and stems than White Panicum. Like the common weed Barnyard Millet (to which both these crops are closely allied) Japanese Millet will tolerate temporary flooding. It is a most vigorous grower, with ungrazed crops reaching a height of up to 6 ft.

Japanese millet should be grazed quickly and often. In this manner, as many as seven re-growths have been recorded. Grain crops take about 100 days to mature. Under good conditions stands may be grazed within three weeks of sowing (Plate 3).

Millet for Grain.—As grain crops, millets are simple to handle. They all have a yield potential of over 60 bushels per acre.

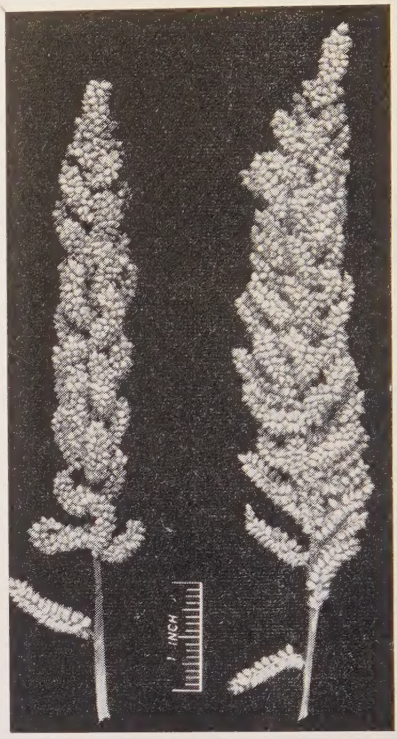

Plate 3.

Heads of Japanese Millet. This millet is finer in leaf and stem than White Panicum. Its seedhead and seed are very similar to White Panicum but usually darker in colour.

Millet grains normally thresh easily, presenting no harvesting difficulties. The principle exception is the Korean variety of setaria which does cause clogging of some machines. The speed and efficiency of harvesting of all millet varieties will be reduced in the case of badly lodged and tangled crops.

Only new or good "once-used" sacks should be used, as the small seed trickles freely. Because of this, the trade often demands that these seeds be double bagged.

Giant Setaria, though listed as a dual purpose crop is also a good grain millet.

White French.—White French millet (Plate 4) has a yield potential of about 75 bushels per acre. Plants stool readily and poor plant stands often give good results.

Under conditions of ample moisture, well-established plants will thrive on hot summer weather; for this reason December appears to be an ideal sowing month. It is these midseason crops which return high grain yields.

The stems and leaves of White French Millet are hairy and fibrous. These characteristics make it virtually useless as a grazing or hay crop.

White French Millet matures in about 90-100 days.

Plate 4.

Heads of White French Millet.—French Millet is easily identified as the only common millet with an open drooping head.

Dwarf Setaria.—This setaria (Plate 5) is used solely for grain production. Though its yield potential is below that of the Giant strain, the Dwarf has enjoyed great popularity in the grain-growing areas. This appears to be due to the fact that it is the quickest-maturing millet available, crops ripening in about 80 days. In trade circles the grain is usually referred to as "panicum," where it is widely used for bird seed mixtures.

Dwarf Setaria produces less leaf than other millets. This characteristic coupled with its quick-maturing habit reduces the plant's moisture requirements. Accordingly Dwarf Setaria is in demand as a quick "change-over" crop, for example, in switching from winter to summer crop production.

Dwarf Setaria is very susceptible to Head and Leaf Blast (Plate 8). On this account Korean Setaria could claim popularity at the expense of Dwarf.

Korean Setaria.—Korean Setaria was allegedly introduced by an Australian soldier returning from the Korean War. As its botanical name might suggest (*Setaria italica* var. *purpurea*) the foliage and seed head colour is tinged with purple. This coloration is most distinctive.

While Korean is very distinctive in appearance, it should be remembered that it is merely a variety of setaria, closely allied to Giant and Dwarf. For trade purposes, therefore, it should be referred to simply as setaria (or panicum) and not as a distinct class of millet.

In maturity, Korean is only a few days slower than Dwarf. It produces an extremely large head (Plate 5) and

is reported to have a yield potential of 90 bushels per acre. In the 1958 Setaria strain trial on the Darling Downs it outyielded Giant and Dwarf Setaria in the order of 3: 2: 1, and returned an average yield of about 70 bushels per acre.

Korean is resistant to the Head and Leaf Blast which can devastate crops of Dwarf and Giant (Plate 8).

The grain is smaller and lighter than that of the other setarias and because of these factors has met some trade resistance during the first year of commercial distribution (1958). A good deal of this discrimination is no doubt due to the fact that it has been offered for sale under such names as "Korean Millet" instead of merely as setaria (or panicum). Grain analysis indicates a feeding value at least equal, and possibly superior, to Dwarf and Giant Setaria. Cage-bird feeding tests also show the grain to be acceptable to the bird seed trade.

Korean Setaria appears to have two undesirable features. Firstly, the germinating plants and young seedlings seem most sensitive to hot weather and so may be difficult to establish on black soils. Secondly, the heavy pendulous head introduces a harvesting problem.

The weight of the head bends the stalk over and necessitates the taking of an unusually great amount of this stalk during harvesting. The tough wiry stems readily twine around all moving header-harvester parts. This trouble is overcome by using harvesting machines capable of handling a great bulk of material. These machines cut the standing crop quite close to the ground. The resultant bulk admixture of leaf and lower trash prevents the twining of the wiry stems.

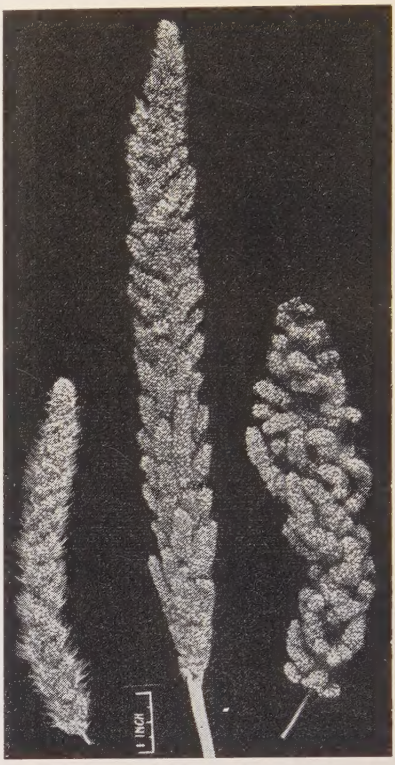

Plate 5.

Left, Common Setaria (Dwarf or Giant); centre, Nunbank Setaria; right, Korean Setaria. The Nunbank variety although possessing a very large head, has not so far proved superior to the old Giant Setaria; Korean gives promise to being a high yielding and disease resistant crop.

Its yield potential and disease resistance, however, more than offset these disadvantages, and Korean Setaria could well become the principal grain millet in Queensland.

Dual Purpose Millet.—*Giant Setaria* is the only true dual purpose millet, but provides relatively inferior grazing.

Like White Panicum, it has a relatively long growing period, being 2–3 weeks slower than Dwarf Setaria.

Mid-season crops take about 105 days to mature. It produces a good body of leaf. As a dual purpose crop it should be subjected to heavy quick grazings in preference to one prolonged grazing period.

With the availability of superior grazing millets, Giant Setaria would be better reserved for grain production. Though slow, it has perhaps a greater yield potential than Dwarf Setaria.

Like the Dwarf strain it is subject to Head and Leaf Blast. (Plate 8.)

Nunbank Setaria.—This strain, which is described in the following section, may also prove useful as a dual purpose millet.

Miscellaneous Millets.—Nunbank Setaria and Bulrush Millet are the two types in the miscellaneous group. At this stage we have insufficient experience of these types to allow their recommendation for commercial production in Queensland.

Nunbank Setaria.—This millet (Plate 5) has taken its name from the property "Nunbank," at Taroom, where it was first established on plots laid down by C.S.I.R.O. Nunbank Setaria was released commercially in 1958.

It is the most vigorous of all local setarias, reaching a height of about 6 ft. It is very leafy and gives the appearance of being a good grazing crop. Seed, midway between Giant Setaria and White French Millet in size, is borne on very large heads.

Nunbank Setaria, like Korean, is resistant to Head and Leaf Blast.

This strain, however, is very slow and takes 2 to 3 weeks longer to mature than Giant Setaria.

In its one test season on the Darling Downs, Nunbank returned a grain yield comparable with that of Giant

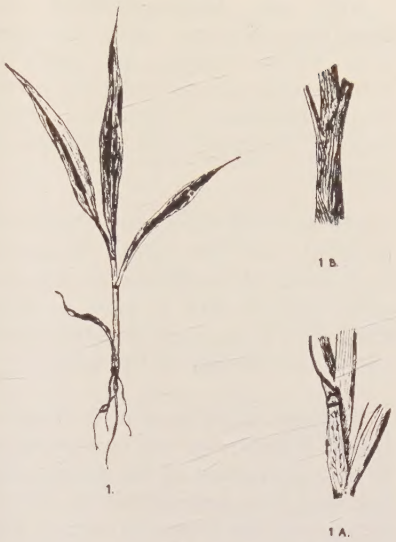

Plate 6.

Seedling Difference between Giant and Dwarf Setaria. (1) is a typical setaria seedling; (1B) a lower leaf sheath of Dwarf Setaria showing profusion of hairs; (1A) a similar leaf sheath of Giant Setaria showing sparse hair development.

Setaria but inferior to that of Korean. At the moment, therefore, Nunbank is not recommended as a grain crop. Neither can it be recommended as a grazing or dual purpose crop until its field performance is more fully known.

Bulrush Millet.—Pearl (or Bulrush) Millet has been tried only in experimental areas throughout Queensland.

This grain millet grows quite readily in Queensland, but has no special virtues which would warrant its cultivation in place of any other millet. Its main use is in countries in which grain is in much higher demand than here for feeding human beings as well as domestic stock.

It is a relatively coarse millet with a higher water requirement than those previously discussed.

Aids in Distinguishing the Setarias.—Korean with its purplish foliage colour, and Nunbank, with its seed size and plant vigour are simply identified. Giant and Dwarf Setaria, however, are difficult to separate.

The seeds of Giant and Dwarf are identical to the eye. Moreover, environmental conditions so influence plant growth that it may be quite impossible to separate advanced Giant and Dwarf strains in the field.

Whether or not a plant is Giant or Dwarf Setaria can best be determined by an examination of the plants when just over 3 in. high. (Plate 6). Dwarf Setaria will be found to bear a profusion of hairs on the lower leaf sheath. Giant Setaria is free from such hair, and is in fact, the only common setaria not exhibiting this characteristic.

Millets for Hay and Silage.—Both grazing millets, White Panicum and Japanese Millet are good conconservation fodders. Giant Setaria and possibly Nunbank Setaria both have some value as such but none of the other millets is recommended for the purpose.

White Panicum because of its coarse stem takes longer to cure for hay than Japanese Millet. Both should be cut in the very early heading stage.

Both grazing millets make reasonably good silage, giving yields as high as 6–8 tons per acre. In ensiling, the value is enhanced by the addition of cowpeas. A suggested sowing mixture is 5–6 lb. millet and 10 lb. cowpeas per acre. The millets should be in the firm dough stage for ensiling. Even so, it still may be necessary to wilt the material of vigorously grown crops prior to ensiling.

Plate 7.

Head Smut Disease of White French Millet. These two heads show different manifestations of the disease.

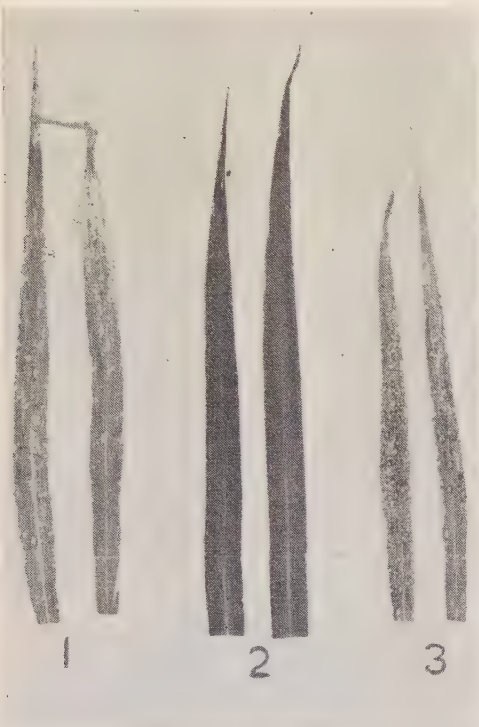

Plate 8.

Leaf and Head Blast Disease on Leaves of Setaria. (1) Giant Setaria (susceptible); (2) Korean Setaria (resistant); (3) Dwarf Setaria (susceptible).

Millet Grain—Its Feeding Value.—The millet grains, though used primarily as bird seed also provide good stock food.

The results of all analyses carried out to date suggest that all these millets have a very similar composition and digestibility. The feeding value of any one strain is not constant, of course. It may vary considerably with soil type, season, and so on. However, there is nothing to suggest that there is any constant difference in feed value for general stock purposes, between any of the millet grains discussed here.

When feeding stock with millet grain three practices should be observed:—

(1) Grains should be crushed, as otherwise a considerable proportion of the seeds can be voided whole. This not only means a waste of grain but provides a means of spreading live seed to unwanted areas in droppings.

(2) Millet grain should be fed for its energy, not for its protein value. It should be fed with a protein supplement and also a fibre supplement in the case of ruminants.

(3) Millet grain is relatively low in calcium and about ½ per cent. ground limestone should be added for the maintenance of ruminants.

The relative purchasing-feeding values of millet and other grains can be determined by dividing the cost per bushel by the following figures:—

Millet grains	30
Grain Sorghum ..	46
Wheat	43
Maize	43
Barley	36
Oats	24

Whichever grain gives the lowest figure after division, is then the cheapest food, for example, millet at 7s. 6d. per bushel would have a value equal to grain sorghum at 11s. 6d. per bushel.

Diseases*.—There are very few important diseases of millets in Queensland. The control of these diseases is achieved by seed treatment

* Contributed by T. McKnight, Senior Pathologist, Toowoomba.

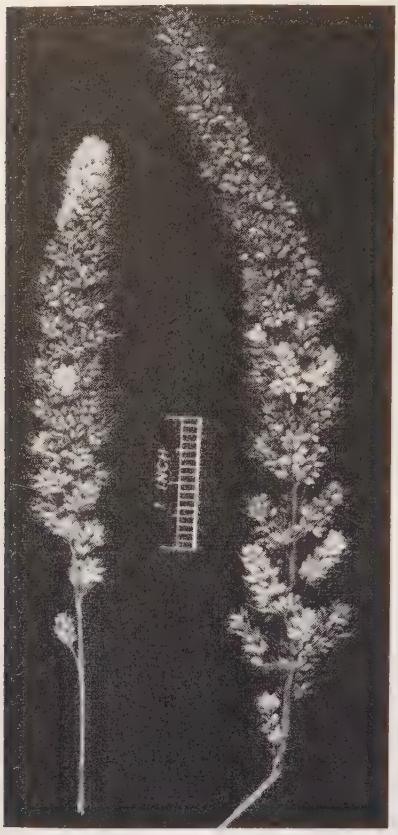

Plate 9.

Leaf and Head Blast Disease on Heads of Dwarf Setaria.

with fungicidal dusts, by crop rotations, and by the use of resistant varieties.

Head Smut Disease†.—Head Smut of French Millet is a commonly encountered disease in Queensland and severe losses may occur if untreated seed is sown.

The disease is readily recognised (Plate 7). Generally the entire head is replaced by a mass of dark smut spores enclosed in a greyish-white membrane (left-hand specimen). Occasionally several smut masses enclosed in membranes appear, and these may be accompanied by unusual leaf-like growth (right-hand specimen).

The smut membranes are broken up during harvesting and the spores contaminate healthy seed. In this way the disease is introduced to clean farms. As the fungus may live in the soil from season to season, crop rotation should also be practised. Fortunately, seed infection is readily controlled by the use of any of the proprietary mercury or copper carbonate dusts.

Leaf and Head Blast Disease‡.—Leaf and Head Blast disease of the setaria millets is a regularly recurring disease in Queensland. Its incidence is associated with humid weather, and in seasons favourable for its development the disease causes severe losses.

The disease attacks the leaves and the heads (Plates 8 and 9). The leaf spots are small and circular and when numerous cause the leaves and sheaths to dry out and turn brown. The fungus produces dark-brown, rotted areas on the branches of the head and this prevents seed development.

Seed treatment with any of the proprietary dusts is advisable to destroy surface contamination and ensure good germination. However, as the fungus is so effectively distributed through the air the use of a resistant variety is the only answer to this disease in areas where its regular occurrence can be anticipated.

Both Korean and Nunbank Setaria are resistant to Leaf and Head Blast. Provided the agronomic characteristics of these setarias meet requirements then Korean and Nunbank should be used in preference to the susceptible Dwarf and Giant Setarias.

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† Caused by the fungus *Sphacelotheca destruens.*

‡ Caused by fungus *Piricularia oryzae.*

Plate 10.

Heat-wave Effects on Setaria Heads. This pinching and malformation of heads was due to hot, dry weather about heading time.

A Physiological Disorder.—Occasionally abnormalities as indicated in Plate 10 occur in crops of the setaria group.

Such disorders invariably appear during hot, dry seasons. This type of malformation is evident in the developing head long before its emergence from the sheath.

This is purely a seasonal effect, both irregular and unusual. Of all the setarias, Korean appears to be the most susceptible to this disorder.

Insect Pests.—There are no major pests in millet crops. Occasionally seed harvesting ants may be troublesome after planting; army-worms may attack young stands, and *Heliothis* caterpillars appear in the developing seed heads.

Methods of control are available for these pests but early detection of their presence is important. Advice on current control recommendations can be obtained from the nearest advisory office of the Department of Agriculture and Stock.

This Actually Happened

A REPORT from another State says that a small child was out with her father on an old steel-wheeled tractor. This machine had no brakes, and it was left on a slight incline, with the engine running. The vibration of the engine started the tractor moving. The child was standing behind the driver's seat. She lost her balance and fell beneath the tractor, where she was crushed by one of the wheels.

This sad event was caused through using a faulty machine, and leaving it in neutral with the engine running.

The engine should have been stopped; the tractor placed in gear.

Tobacco Grown in Nut Grass Land

By J. B. GUDE,
Field Assistant,
Agriculture Branch.

Ingham farmer Mr. Peter Bogotto succeeded in growing a profitable tobacco crop in the 1957-58 season despite heavy nut grass infestation.

Farmers in districts where the growing of various crops in competition with nut grass is commonplace, might well ask, "What is unusual about that?". The unusual feature is that tobacco in the past has been grown very largely on nut grass-free land. Thus many tobacco growers have accepted the idea that the presence of nut grass on a farm means the ruination of land for tobacco. However, the pest is spreading in some of the closer settled areas, and tobacco growers may find it necessary to adjust their farming techniques to meet nut grass competition.

Plate 2. **Mr. Peter Bogotto, of Ingham.**

Plate 1. **Top View of a Well-Grown Tobacco Plant 3½ Weeks From Planting Out.** Although cultivated one week previously, nut grass is again becoming prevalent.

Mr. Bogotto has made a success of his early attempts at tobacco growing in nut grass land. Although approximately half of the area was heavily infested with nut grass, his 6½ acres of Hicks variety produced 3 tons of leaf which returned over £3,000. Growth, yield and leaf quality were reasonably uniform over the whole area. The yield of 920 lb. per acre compared more than favourably with district averages.

Land Preparation.

The land was allowed to revert to native grasses and weeds for two years before preparation for this crop. The first ploughing took place in early May and, in order to keep the nut grass in check, the area was cultivated on three occasions during the fallowing period. The soil was finally brought into a fine planting tilth in early September by ploughing and discing.

Plate 3.

The Crop Six Weeks After Planting Out. The evenness of the growth can be seen.

Plate 4.

The Crop at Maturity. This photograph was taken after the third pick. Note the well-developed leaves.

The soil fumigant EDB was applied in a single row treatment at 10 gal. per acre, for the control of nematodes. One week after this treatment the area was fertilized with a 2:15:8 mixture at 400 lb. per acre, and planted.

The tobacco seedlings were strong and healthy and this enabled the crop to move away to a good start with little setback. It also enabled the farmer to cultivate early, without smothering or damaging plants. Good planting material is essential when the crop has to compete with nut grass.

The crop was chipped and cultivated two weeks after planting and this was repeated three weeks later. The combined jobs were done thoroughly on both occasions, the nut grass being removed from around the plants. This was a slow job, but to quote the farmer's words, "It was worth doing, as the plants received no setback at all. We were well repaid for our trouble."

Irrigation and Crop Growth.

Irrigation was by means of overhead sprays commonly used in the Ingham district. The crop was watered at intervals of 5 to 6 days, and a steady uniform growth rate was maintained throughout (Plate 3). The plants reached a height of 7 ft. before topping. Nut grass ceased to be a problem after the tobacco plants had reached 2 ft.

Harvesting commenced in early November, and from a total yield of 3 tons, 5,538 lb. of cured leaf was sold for an average price of 11s. 7d. a lb.

Tobacco farmers will be encouraged by the results achieved by Mr. Bogotto. He has shown that, with some little extra effort, tobacco can be grown in competition with a heavy nut grass infestation, and a really worthwhile crop obtained.

Cotton For The Lockyer

Question: A Lockyer Valley farmer is seeking information about cotton and its suitability to the area?

Answer: Farmers have grown good crops of cotton in the Lockyer Valley. They produced about 600 lb. per acre in normal years and when good conditions prevailed their crops produced 1,000 lb. per acre. If you can irrigate, your yields may reach 2,000 lb. per acre while a good average crop should produce from 1,000 lb. to 1,500 lb. per acre.

Plantings between October and mid-November are desirable; however, lack of rain at this time may cause delays in obtaining a strike. It is desirable to have all plantings finished by early December.

Harvesting can be done by hand-picking or by machinery. Most cotton growers arrange for machine harvesting of their cotton. By contacting the Cotton Marketing Board you can obtain information relating to the availability of machines for cotton harvesting in the Lockyer. The Board owns the machines and controls their allocation.

All cotton above the grade Strict Good Ordinary, receives a guaranteed price of 14d. a lb. Very little cotton produced in this State does not qualify for this grade.

Abundance Sweet Potatoes.

Question: C. D., of Ballandean, seeks to know which is the best variety of sweet potatoes to grow?

Answer: Probably the most favourably received variety of sweet potatoes at the Brisbane markets is Abundance. It is a pink-skinned sweet potato which produces good crops with good keeping qualities.

Farm Wisdom

THE most reliable soil analysis is the one done on your own farm.

Soil analysis in the form of a simple fertilizer trial may tell you directly what laboratory analysis can only suggest.

If soil deficiencies are suspect start first with a simple fertilizer trial. If this does not provide your answer then contact your local Agricultural Officer. He can then examine the problem and if necessary take soil samples for a detailed study.

In the first instance growers should consider only the three major food elements, nitrogen (N), phosphate (P) and potash (K).

As a rough guide to what responses growers may expect it is likely that some response to nitrogen will be obtained on most soil types. All timbered country (especially box and ironbark) can be suspected as being phosphate deficient. Potash, though generally satisfactory, may also be short. On cypress and bull oak country all three major elements, N., P. and K. are almost certain to be in short supply.

But a response is not enough—an economic response is required. And here again the field trial can give an answer beyond the scope of chemical analysis.

First select a uniform area of the soil type to be treated.

Then peg the area and apply the fertilizer according to plan.

Materials will only cost about 10s.

Fertilizer may be applied immediately before or during sowing of the crop or on existing stands of lucerne and pasture and so on. In the latter instance, care must be taken to avoid foliage burn due to contact with the fertilizer.

Response to these treatments will indicate what element or elements are lacking in the soil.

Then, for example, if all plots containing phosphate give improved crop growth it is simply a matter of applying strips of superphosphate at varying rates (such as ½, 1 and 2 cwt. per acre) to determine a most economic application.

Nitrogen is an expensive fertilizer. If a deficiency of nitrogen is indicated, in addition to strip application of sulphate of ammonia, growers should give some thought to the use of suitable legumes as a means of building up nitrogen.

—J. HART,
Senior Adviser in Agriculture.

A SOIL conservation plan for your farm is yours for the asking. It doesn't cost you anything and it doesn't commit you in any way. But it will show you how to plan for conservation. In fact, it's a blue-print for farm development. Even if you don't intend to do any contouring immediately, it will help you plan your farm on a sound conservation basis.

With a farm plan, you can carry out conservation works in stages to suit your needs. But each stage is a step in the complete protection of your farm, and the final pattern is in front of you as you complete each stage.

To get a soil conservation plan for your farm, call on your local Soil Conservation Officer; he'll discuss your problems and arrange to have your farm inspected.

—J. E. LADEWIG,
Chief Soil Conservationist.

IF you go about it in the right way, you need not disturb the levels when you're ploughing land under flood irrigation. Costly grading to restore the gradient after ploughing is unnecessary. The method of ploughing is to treat each border as a "land." Throw the first furrow slice against the check bank and make the finishing or dead furrow close to or cutting slightly into the check bank on the opposite side of the border.

Lay out the ploughing of the lands so that the check bank has a furrow slice thrown up on one side and a furrow cut away on the other. After you've ploughed the borders, work the check bank down and re-form it with a crowder.

—A. NAGLE,
Irrigationist.

THE wise wheat farmer uses fallowing to encourage the storage of moisture in the soil for use by the coming crop. Fallowing enables some of the rain that falls some months before the wheat crop is planted to be made available to the crop. It also encourages the release of nitrogen in the soil.

The practice is particularly important in any summer rainfall area where winter crops are grown. In fact, it would be practically impossible to grow wheat or any other winter crop in Queensland without fallowing.

To give you some idea of the importance of fallowing, it has been worked out that the equivalent of 7½ in. of rainfall is needed to bring a 25-bushel wheat crop through from planting to harvest; most of this is needed in the period from June till the middle of October. We have little chance of getting this rain in these months, but by fallowing we can store in the soil some of the rain that falls in the summer and autumn, our wettest months.

In some places of very low rainfall the fallow is carried through two summers to enable enough moisture to be stored. But in Queensland, the fallow is usually carried through only one summer.

The system works best in soils with a good moisture-retaining subsoil. Such soils usually have a high clay content and are rich in organic matter. Generally, the lighter and more free-draining the soil is, the less effective the fallow.

After a good fallow all that is needed to establish the winter crop is sufficient rain at planting time to enable the seed to germinate. Of course the extra falls we normally get during the growth of our wheat crop are very helpful and necessary to get a really good crop. But it is the moisture stored in the fallow that provides the reserves that the crop draws on between these falls.

The technique of establishing a fallow is to work the soil as soon after harvest of the last winter crop as possible. Tined implements such as chisel ploughs are useful for this. The soil is left open and in a fairly rough condition through the summer. Stubble should be left on top to break up the heavy raindrops. This allows the summer rain to soak in. If the land is sloping it should be contoured to prevent soil erosion.

As planting time approaches the soil should be worked up to form a good compact seed bed. These workings will also be helpful in controlling weeds. If summer weeds are bad and the cultivations necessary to destroy these would make the fallow too fine too early, they should be controlled by hormone weedkillers instead. Generally, though, the workings necessary to maintain the fallow are sufficient to kill the weeds.

—D. R. EVANS,
Assistant Experimentalist.

THE use of fungicidal seed dressings to ensure a good stand of peanuts has long been an established practice in the peanut industry. The crop is particularly susceptible to a pre-emergence rot, a fungal disease which attacks the seed immediately after sowing. This is readily controlled by seed treatment with organo-mercurial compounds.

A second condition known as crown rot attacks the seedlings after emergence. It can be recognised by the copious quantity of black spore material produced on the decaying stems of diseased plants. It is quite distinct from pre-emergence rot, and organo-mercurial compounds are ineffective against it. Indeed in many cases these materials actually increase crown rot severity.

Other compounds such as thiram, chloranil and captan when used as seed dressings give a considerable reduction of crown rot. In trials carried out by the Department of Agriculture and Stock in Queensland, captan has proved the superior compound. However, this material, while giving fair control of pre-emergence rot, is not consistently as efficient as the organo-mercurials in this regard. Research indicates that a combination dust containing both an organo-mercurial compound and captan gives promise of controlling both diseases when applied as a seed dressing.

—G. PURSS,
Pathologist.

FARMERS who are growing cotton for the first time will want to know how their product is graded: On arrival at the ginneries (Glenmore and Whinstanes) the bales and bags of seed cotton are unloaded from the railway waggons on to the platform and wheeled along to a position on the platform where there is a good natural light for grading.

The seed cotton grader then opens the bales along one of the hand-sown edges, takes out two or three samples from different parts of the bale and examines these for grade and staple length.

Grade is assessed by the colour, amount of leaf or other foreign matter in the cotton, such as soil, grass, burrs (if any), the amount of yellow spot and immature locks in the seed cotton.

When the grader has examined the seed cotton and decided the grade, he takes small quantities of seed cotton from different parts of the bale, pulls these apart between his hands to ascertain the length of the fibre.

Having decided the grade and staple length, the grader attaches a tag to the top of the bale on which the grade and staple length are marked.

The bale of seed cotton is then wheeled on to a Government-tested scale where the weighing clerk checks the name, address and registered number on the bale, weighs the bale and enters the gross weight, tare, net weight, variety of cotton and the grade and staple length, in his seed cotton receival book, against the grower's name, address and registered number.

The weighing clerk also writes the gross weight, tare and net weight on the grade tag of every bale of seed cotton.

If the seed from any consignment of seed cotton is to be saved for planting, the weighing clerk marks P.S. (pure seed) on the grade tag.

The bales of seed cotton marked P.S. are put into separate varietal stacks in a different part of a large shed, away from seed cotton which contains oil mill seed.

Agricultural officers in the cotton-growing districts send information to the Department and from this the Department decides which cotton can be saved for planting seed.

—F. MANUELL,
Cotton Grader.

Plate 1.

Helicopter's eye view of part of the Farmers' Festival, showing the gadgets section and the large hayshed in which Departmental displays were centred.

Festival Had Much To Offer

Farm gadgets alone were worth travelling miles to see at the Farmers' Festival last September.

Queensland's first two-day Farmers' Festival won enthusiastic acclaim for the marked success it achieved in passing on useful information to the farmer and for the satisfactory way in which the work of the festival was shared by the organisers.

It was agreed that the festival succeeded in doing what it set out to do—that is, to show on the farm by display and actual operation what is offering today in the way of farm machinery and farming knowledge.

One farmer, who spent most of the two days at the festival, said, as he was leaving: "I've never had the opportunity before of seeing so much machinery working on one farm. You could take your pick from just about all the farm machinery there is . . ."

Plate 2.

The Minister for Agriculture and Stock (Hon. O. O. Madsen) opening the Farmers' Festival on the first day, when an estimated 8,000 people attended.

Other farmers agreed that they got valuable information from viewing the very comprehensive displays by the Department, by talking to its officers and advisers, and to leading farmers there, and by seeing the line-up of farm gadgets.

The festival was held on the properties of Messrs. A. Barkla and H. Devine, at Wellcamp, near Toowoomba. It was organised by the Eastern Downs Dairy Extension Advisory Committee, with the co-operation of machinery firms, farmers, and the Department of Agriculture and Stock.

Plate 3.

A small section of the crowd at the festival, listening to an address by the Under Secretary of the Department of Agriculture and Stock (Dr. W. A. T. Summerville).

Plate 4.

Aerial view of Mr. A. Barkla's farm, showing ploughed areas where machinery was demonstrated.

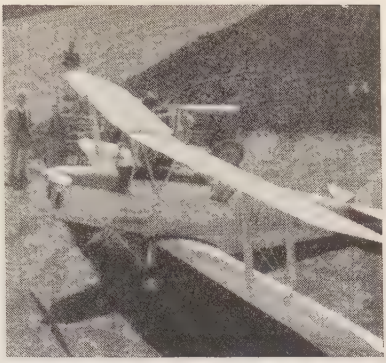

Plate 5.

Crop spraying by aeroplane and helicopter proved to be amongst the highlights of the festival. The pilots of both aircraft gave polished displays of spraying at crop height.

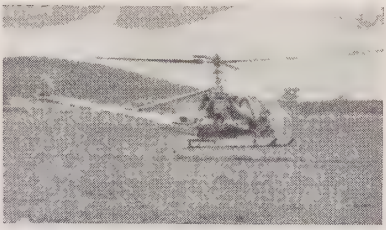

Plate 6.

This helicopter came really low in its crop spraying demonstration.

Plate 7.

Irrigation equipment of all kinds was on display in a special area.

Plate 8.

Display by Cattle Husbandry Branch, which featured foodstuffs for cattle and balanced ration for maintenance and production.

Plate 9.

Machinery on Display. In many instances farmers were invited to, and did, put the various tractors and so on through their paces in the paddocks.

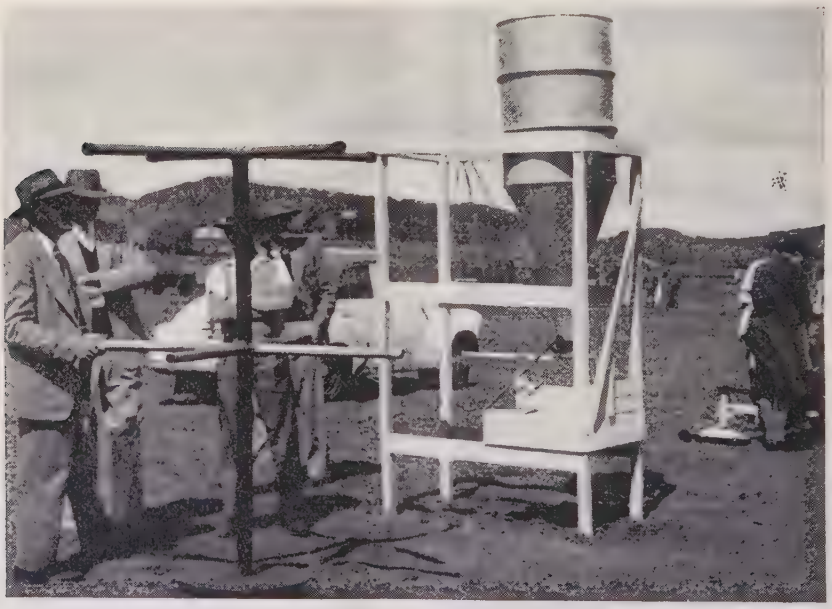

Plate 10.

First award for a useful hint applicable to farming was received by F. W. Filbie, of Jandowae, for his automatic self-measuring bail hopper (at right in picture). The hopper is fitted with an automatic measuring device consisting of two butterfly valves. When the lower valve is closed the top opens, allowing a measured feed to be held in the hopper neck. As the lever is raised to release the feed, the upper valve closes, opening again on the closing of the lower valve, and allowing another measure of feed to enter. The feed falls on a slide, which can be tilted to either one side or other of the dividing wall between the feed boxes. Second prize in this section went to a "milk equaliser" designed by L. Iseppi, of Bowenville.

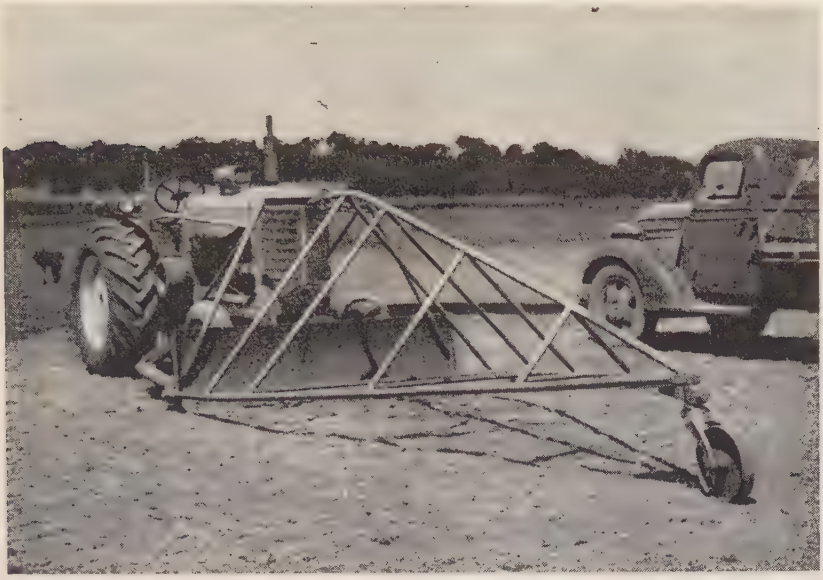

Plate 11.

Winner of the major award for gadgets was this homemade dozer unit fitted with manual lift and land leveller. This useful equipment, which will be fully described in a later Journal, was entered by G. M. Lehmann, of Clifton. This entry won the major prize, donated by "The Toowoomba Chronicle."

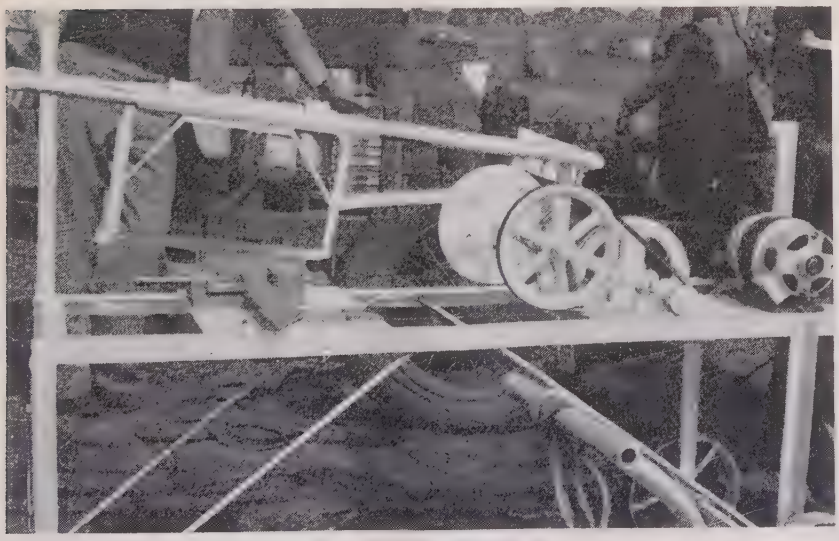

Plate 12.

Second prize in Class 1 went to R. F. Hudson, of Southbrook, for a 32-volt powered hack saw and power forge, mounted as one unit on two wheels. Mr. Hudson also exhibited an electric welder mounted on a car chassis and powered by a motor from an old model A Ford.

Plate 13. **Queen of the Toowoomba Carnival of Flowers, Miss Joan Rainbow, who presented prizes.**

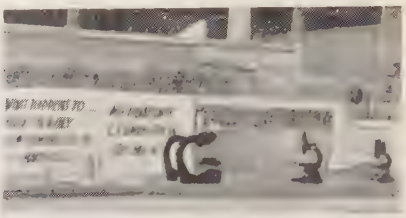

Plate 14.

Departmental display showing equipment for microscopic examination of bacterial contamination of milk.

Plate 15.

This wire-winding reel operated by one man was selected as first prize-winner in Class 1, Section 11 (minor items). It was entered by R. B. Clapp, of Texas. Second prize went to N. R. Feichtner, of Greenmount, for a wind-operated electric fencer unit. This unit was described in detail in last month's Journal.

Improved Pastures Put Weight On Steers

By K. A. TAYLOR, Cattle Husbandry Branch.

Two groups of Aberdeen Angus steers when grazed on improved pasture following weaning gained averages of 0·95 lb. and 0·94 lb. liveweight a day for 20 months in spite of three months of flood weather during which they lost 1 lb. a day. One of the steers gained 361 lb. more liveweight than another of the same age with which it had been running, showing the extent of variation in performance.

These were some of the findings of a recent cattle weighing trial conducted on "Texas Station", Texas, by the Department of Agriculture and Stock in co-operation with the Scottish Australian Co. Ltd.'s manager there, Mr. R. C. Shannon.

The main aims of the project were to record the changes in liveweight of Aberdeen Angus steers under improved grazing conditions, from weaning until disposal as fat cattle, and to record the dressed weights of as many of the steers as possible and view these in conjunction with performance while alive.

Weighings were made over 20 months (575 days) and corresponded to the period from weaning to disposal as fat steers.

Two groups of Aberdeen Angus weaner steers were used: *Group A*—15 Aberdeen Angus weaner steers weaned on July 19, 1955, selected as a representative sample of a group of 100 weaners. All the weaners of this group were the first calves of heifers mated at 12 months; *Group B*—15 Aberdeen Angus weaner steers, weaned on June 7, 1955, selected as a representative sample of a group of 100 weaners which were the first calves of heifers mated at 2 years.

Cattle used in both groups were from the same "drop", most being born in November, 1954.

Individual cattle were identified by using coloured plastic eartags, each stamped with a different number. The colour of the tag identified the group, and the number on it identified the individual. The first weighing was made on July 19, 1955. Thereafter, the cattle were weighed every 28th day, except where exceptional circumstances (floods) prevented it.

The steers were fasted before each weighing. They were normally yarded about 5 o'clock on the evening before weighing. Weighing usually commenced at 8.30 a.m. They were returned to their paddock (about 1 mile) after weighing.

Grazing.

The pasture consisted mainly of a lucerne, rye grass, and phalaris mixture. Natural pasture was also utilised; the cattle frequently having free access to both improved and natural pastures. None of these pastures was irrigated. Small paddocks were used, and stocking rate varied in different paddocks; but on an average they were grazed at 1 beast to 1½ acres.

Performance.

Plate 1 shows the average liveweight gains of each group from July 19, 1955 (weaning), to March 5,

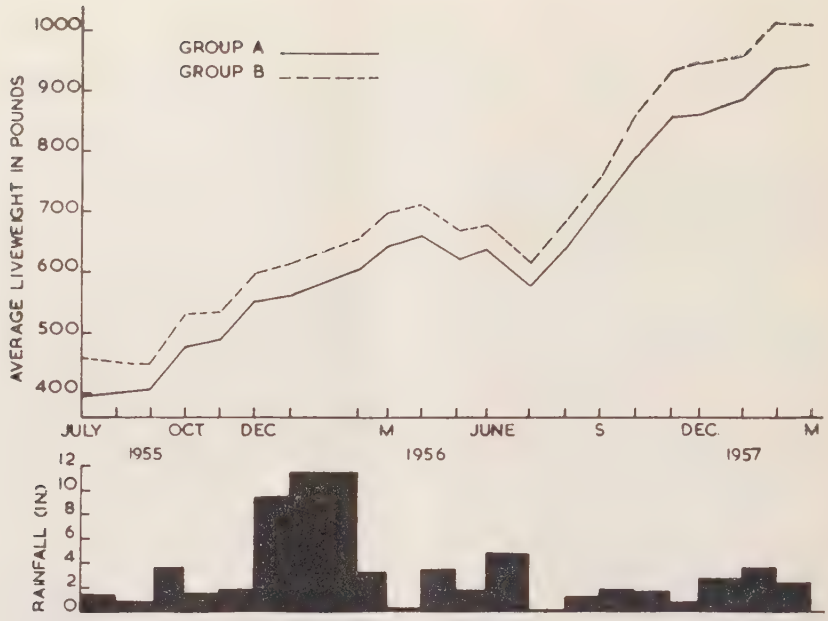

Plate 1.

Graph Showing (a) Average Liveweight Gains and (b) Rainfall.

1957, just prior to their slaughter. The average age at the first weighing was 8 months, and at the last weighing was 28 months.

Table 1 shows the performance of the individual animals in each group. It was not possible to obtain the dressing percentage of all animals in each group.

Results.

Over the 20-month period the cattle in Group A averaged a daily increase in liveweight of 0·94 lb. In Group B the average was 0·95 lb. These figures are most satisfactory, particularly considering the gross set-back encountered from April to July, 1956. During this period large areas of Texas Station were under water in some of the worst flooding in its history. The cattle grazed wherever they could on the high country. Station management was completely upset and the cattle lost an average of 1 lb. per day for 3 months. In fact the average weights on July 24, 1956, were approximately the same as they had been on January 4, 1956. However, a return to favourable conditions soon brought rapid growth rates, with the result that the steers were still "turned off" in fat condition at less than 2½ years of age.

The two groups behaved in an almost identical manner, as can be seen in Plate 1. Their average weights rose and fell to the same degree as environmental conditions fluctuated. The two groups began the project with an average difference in liveweight of 63 lb. and finished with an average difference of 70 lb.

Carcasses.

The quality of the carcasses was excellent. An appraisal was carried out by Mr. A. A. Seawright, Divisional Veterinary Officer, on 10 of the best steers. He used the system evolved in New Zealand by Kneebone, Marks, McMeekan and

TABLE 1.

GROUP A :

No.	Initial Weight. (lb.)	Final Weight. (lb.)	Gain. (lb.)	Dressed Weight. (lb.)	Dressing. (%)
1	412	1,096	684	646	58·9
2	389	956	567	544	56·9
3	377	820	443	454	55·4
5	509	1,126	617	Not known	..
6	330	768	438	Not known	..
7	385	1,032	647	575	55·7
9	492	1,160	668	Not known	..
10	409	889	480	505	56·8
11	406	860	454	487	56·6
12	383	892	509	492	55·2
13	367	988	621	568	57·5
14	371	694	323	Not known	..
15	323	917	594	522	56·9
Average : (13 head)	396	938	542	533 (9 head)	56·7 (9 head)
Range :	323–509	694–1,160	323–684	..	..

Average gain per day — 0·94 lb.

GROUP B :

No.	Initial Weight. (lb.)	Final Weight. (lb.)	Gain. (lb.)	Dressed Weight. (lb.)	Dressing. (%)
1	430	920	490	Not known	..
2	487	930	443	Not known	..
3	384	1,020	636	581	57·0
4	524	1,096	572	Not known	..
5	473	1,092	619	627	57·4
6	503	1,098	595	Not known	..
7	485	944	459	565	59·8
8	480	820	340	Not known	..
9	415	980	565	556	56·7
10	419	1,071	652	575	53·7
11	489	1,032	543	585	56·7
12	444	1,040	596	617	59·3
13	467	1,017	550	Not known	..
14	426	1,034	608	611	59·1
15	459	1,022	563	569	55·7
Average :	459	1,008	549	587	57·3
Range :	384–524	820–1,098	340–652	(9 head)	(9 head)

Average gain per day — 0·95 lb.

Walker. It is the system used in carcass competitions in southern States, and results compare favourably with those of the best of the groups submitted in carcass competitions there.

Table 2 shows the appraisal score card of 10 of the best steers from this project.

Lack of marbling is not surprising in animals of this age and degree of fatness.

Variation.

The liveweight gains over the 20-month period varied from 323 lb. (No. 14 Group A) to 684 lb. (No. 1 Group A). In these two animals

TABLE 2.

Hot Dressed Weight.	Depth of Eye Muscle (mm.).	Points.	Fat Cover (mm.) over Eye Muscle.	Points.	Blockiness (inches).	Points.	Balance (Weight of Forends—Weight hindends).	Balance Points.	Weight Stability.	Rib Cover.	Eveness of Fat.	Texture of Muscle.	Texture of Fat.	Marbling.	Total.
487	62	16	24	10	15¾	9	—37	10	1	1	5	3	3	..	58
767	65	12	45	1	19	7	—38	6	1	2	7	3	4	..	43
735	66	14	30	14	18½	7	—43	8	1	2	5	3	3	..	57
714	71	16	29	14	17½	11	—32	6	2	2	8	4	4	..	67*
569	63	16	22	14	16½	10	—20	7	3	4	5	4	3	..	66*
581	52	18	19	11	17	12	—35	10	4	3	8	3	5	..	64
665	49	4	41	1	18	6	—27	7	4	1	6	3	3	..	35†
492	54	12	27	8	15	12	—31	10	1	2	5	2	4	..	56
687	59	10	39	3	17	12	—36	8	3	2	5	3	3	..	49
568	60	14	27	11	16½	9	—27	8	3	3	9	4	5	..	66
Possible Score :		20	..	15	..	20	..	10	5	5	10	5	5	5	100

* These were really outstanding carcasses from the appraisal point of view.

† This carcass seemed a good one on visual appraisal but measured very poorly by comparison with the others in the draft.

there is a difference in gain of 361 lb. liveweight. We may regard this 361 lb. difference in liveweight as a difference of (361 × $\frac{57}{100}$) lb., that is 206 lb. dressed weight. This is reasonable, since the average dressing percentage is 57. If the steers in this project were sold at £6 10s. per 100 lb. dressed weight, this means that steer No. 1 produced £13 more beef from the same pasture over 20 months than did No. 14.

Taking the remaining 28 cattle as a whole, the more productive half gained a total of 8,676 lb. liveweight, while the worst half gained 6,600 lb. liveweight. The difference is 2,076 lb. liveweight or 1,183 lb. dressed weight or approximately £77 in cash. This is equal to a difference of £5 5s. per head.

This demonstrates the remarkable variation in ability to gain weight amongst any group of cattle; and the obvious value of fast weight-gaining strains.

Experiments overseas—particularly in U.S.A.—have demonstrated that rate of weight gain in cattle is strongly inherited. This has been revealed when animals are under uniform conditions with ample, good-quality feed. It can be expected that a similar situation would exist here. Selection for the strains of cattle which make high weight gains would result in increased production of beef per acre.

Dr. Hammond's Views On Quality In Meat

By F. H. D. MARSHALL, Technical Officer,
Division of Animal Industry.

Queensland meat producers could turn to profit the views on quality in meat, given by Dr. John Hammond, the eminent British livestock authority, during his visit earlier this year.

In his lecture to the public, Dr. Hammond said that to many people the term "quality" had rather an indefinite meaning. In the meat trade some "experts" used the word in a mysterious sense as though it applied to something not easily understood by the majority. To his mind, the only acceptable definition of "quality" was something for which the public was prepared to pay more than the average price. It represented what satisfied public demand and when this demand was high, the price for "quality" goods was high likewise.

Dr. Hammond said that the illustrations (Plates 1 and 2) depicting two steers, A and B, were marked to indicate the various cuts of meat and the present ruling prices for them on the London wholesale market. The top animal in Plate 1, he said, was a good one and had apparently been well fed throughout its life. The lower animal was not so good, probably having suffered a set-back or store period during its development.

Plate 2, continued the speaker, showed clearly the difference in proportion of the higher priced and more popular cuts to the lower priced and less popular parts in the two animals. The retail butcher wanted a carcass which had a high proportion of loin, rump and buttock meats.

A carcass of poor conformation had too much of the cheaper cuts—leg, belly and neck. As a result the butcher was often left with a quantity of this type of meat on his hands. The public demand today was also for

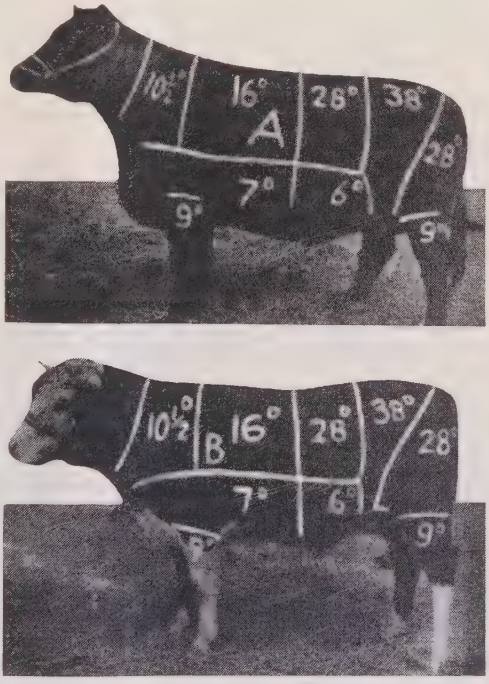

Plate 1.

Two Steers Marked to Show Cuts of Meat and Ruling Prices on the London Wholesale Market.

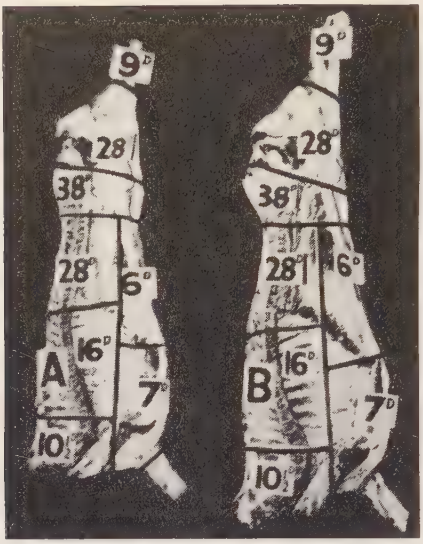

Plate 2.

Difference in Proportion of Higher Priced and More Popular Cuts to Lower Priced and Less Popular Parts in the Two Animals in Plate 1.

young tender meat with much less fat than formerly.

Producers, said Dr. Hammond, should aim to produce the type of carcass in high demand by both butcher and consumer and by so doing, in his opinion, they would be producing "quality" meat.

Plate 3 illustrated the result of breaking up the sides of beef shown in Plate 2. In side A the dressing percentage (carcass yield expressed as a percentage of liveweight) was 63 per cent., including 10 per cent. bone. In side B the respective figures were 55 per cent. and 17 per cent. This illustration, said Dr. Hammond, further accentuated the unprofitable nature of the carcass of poor conformation, which had less quality meat and more bone.

More back; Less Front.

More attention, he said, should be paid by producers to developing the backs and hindquarters of their cattle

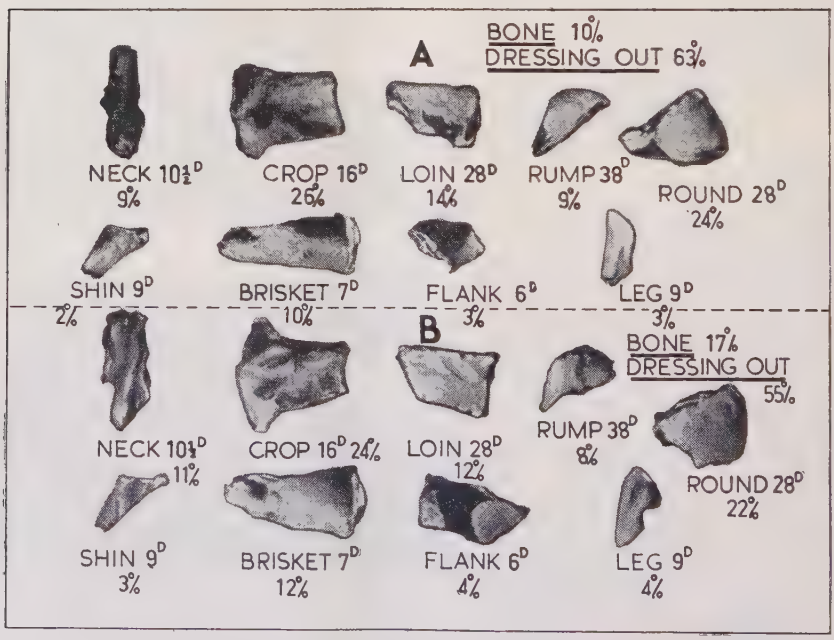

Plate 3.

Result of Breaking Up the Sides of Beef Shown in Plate 2.

while reducing the fronts and underlines. Judges at shows should also bear this in mind and make their awards to those animals which excelled in this respect.

Plate 4, said the lecturer, was to indicate the manner in which cattle grew. The white line superimposed on the bodies of the animals again marked roughly the line between the more valuable and less valuable parts of the carcass. It would be seen that at birth the calf was nearly all head and legs (Fig. 1). As it grew its body lengthened out and the hindquarters developed. At this stage (Fig. 2), the animal was in its best proportions for the butcher. The bone was comparatively short and was covered by a good depth of flesh. Well fed animals should reach this stage of development in about 18 months to 2 years of age. If carried beyond this stage to 3, 4 or even 5 years of age, there was a great increase in depth of rib and length of leg with a resultant increase in the amount of cheaper meat on the carcass (Fig. 3). This was one of the chief defects in Australian beef at the present time.

Experiments had shown, said Dr. Hammond, that a young animal could be kept at a constant weight for twelve months. This was because flesh, which was lost from its back and rump, was redistributed by nature to form bone, which had a high priority demand for the nutrients in the body.

This caused the animal to "go up on the leg" as depicted in Plate 4 (Fig. 4). This store period was detrimental not only to the quality of the meat but to the economics of the beef industry. The English farmer had an expression to cover this phenomenon. He said, "a calf should never lose its baby flesh." Although this type of animal could be fattened later it would still have too high a percentage of bone to meat and in fact it would probably

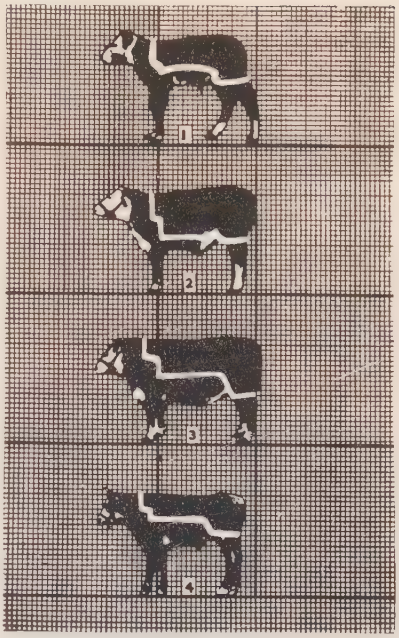

Plate 4.

The Manner in Which Cattle Grow. The white line separates the more valuable from the less valuable parts of the carcass.

tend to put on fat instead of flesh. The key to the whole problem of producing young, tender meat on a profitable type of carcass was to keep the young animal growing all the time.

No Standing Still.

Every effort, said Dr. Hammond, should be made to prevent cattle losing weight or even "standing still" during the winter months. To achieve this it would probably be necessary to conserve and feed fodder. Some weight gain should be aimed at during this period, otherwise, as stated earlier, the animal would grow bone instead of flesh. This plan of production could be justified on economic grounds as cattle could be turned off more quickly. When cattle were held for four or five years a great deal of capital was locked up for an unduly long period.

Plate 5 showed two ribs of beef cut at the last rib and reduced to similar "eye muscle lengths." The difference between the "quality" carcass and one of poorer conformation was very noticeable.

Plate 6 showed ribs of beef from three carcasses entered in the Smithfield Carcass Competition of 1935, the top portion being from the champion carcass, the middle portion from an unfinished carcass and the bottom cut from one that was too fat.

Since 1935, said Dr. Hammond, the public taste in meat had undergone a considerable change and the present demand was for much leaner meat, with only sufficient fat to make it palatable. Probably half an inch of fat would have to be removed from the champion carcass shown in this illustration to make it acceptable on the London market today.

Plate 7 showed five portions of beef cut at the level of the last rib to show differences in the Shape Index, said Dr. Hammond. This was an index used to estimate the general depth of flesh in a carcass but gave no indication of fat cover. The index was based upon measurements of width (A) and depth (B) of the eye muscle. All photographs had been reduced to the same muscle width. The five cuts shown, commencing with the top-most, were:

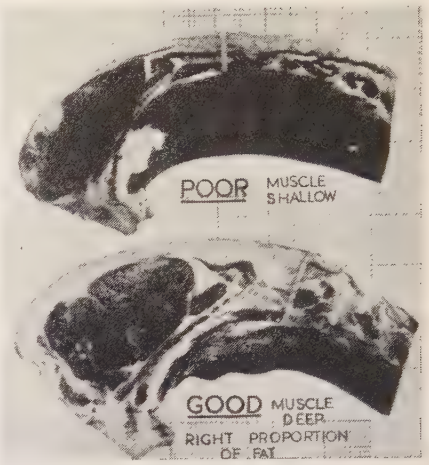

Plate 5.

Ribs of Beef Cut at Last Rib and Reduced to Similar "Eye Muscle" Lengths.

and in long-boned dairy types, this muscle was thin in proportion to its length. "Marbling" fat was visible in the muscles of the older cattle shown in the illustration and this was necessary in older meat to make it tender. It was not so important in younger cattle as their meat was naturally more tender without the deposition of fat among the muscle bundles.

People today were prepared to sacrifice some flavour in meat for

	Width (A) mm.	Depth (B) mm.	Shape Index.
1. Shorthorn—9 months old	130	51	39
2. Red Poll—13 months old	120	59	49
3. Galloway—13 months old	110	59	54
4. Galloway—23 months old	146	83	57
5. Aberdeen Angus—22 months old	135	82	61

Dr. Hammond said that one of the chief considerations today was depth of flesh along the back of the animal. The "eye muscle" was a good gauge of this and in very young beef cattle tenderness and the demand was definitely for the younger carcass with little fat. The three lower portions carried fat in excess of present day requirements.

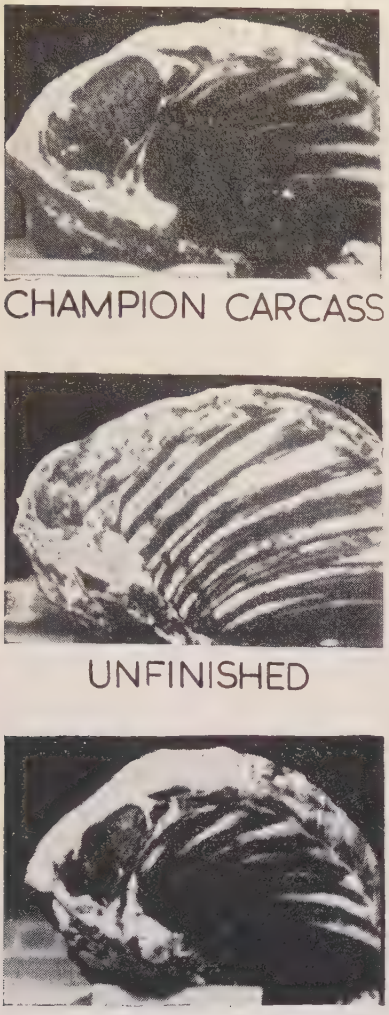

Plate 6.

Ribs of Beef From Carcasses in the Smithfield Carcass Competition of 1935.

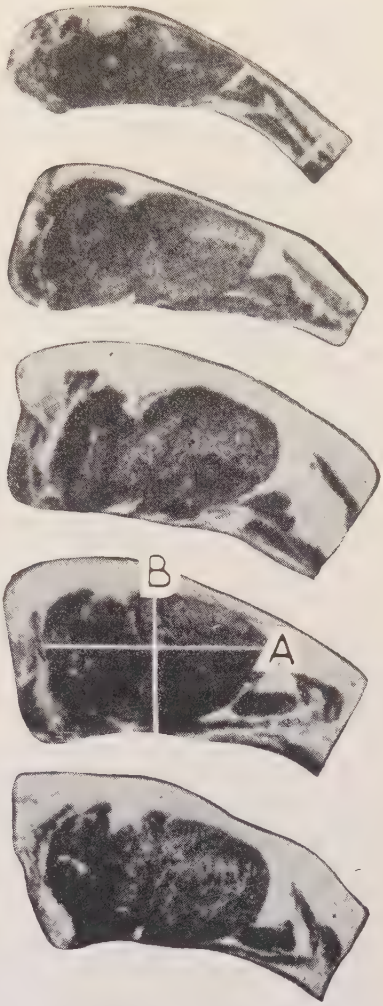

Plate 7.

Five Portions of Beef Cut at the Level of the Last Rib to Show Differences in the Shape Index.

Rule of Thumb.

Another factor in assessing "quality" of meat, said the speaker, was the grain of the meat. In young animals the grain was fine but as the animal grew older it became coarser. Grain could be best tested by rubbing the ball of the thumb across the cut surface of the meat. Fine grained meat felt smooth and velvety to the touch, whereas in old or poor animals it felt coarse and rough.

In referring to the rearing of cattle for meat, Dr. Hammond said that the oestrogenic (female sex) hormones were now being used to increase the rate of growth in steers and also to increase the lean meat in the carcass

at the expense of fat. These hormones did not provide any nutrition—they directed it towards muscle development and away from fat. They were useful only under good feed conditions and were not the answer to bad feeding.

Home-grown Beef in England.

Dr. Hammond then briefly traced the development of the home-grown beef industry in England since 1946. At that date, he said, there were few beef cattle left in England as the result of the war, and beef supplies had to be obtained from dairy cattle. Fortunately, most of the dairy herds comprised large-framed, dual-purpose Freisian cows of the Dutch type and these were crossed with beef bulls to produce "colour marked" beef. Aberdeen Angus or Hereford bulls were principally used to distinctively mark the calves so that they could easily be distinguished in the market place.

This practice was speeded up, said Dr. Hammond, by placing beef bulls in artificial insemination centres. At the commencement of the scheme the Government gave free inseminations to dairy cows from beef bulls but after two years this was found unnecessary as dairy farmers had discovered that beef production along these lines was highly profitable. Artificial insemination was used for a dual purpose. The best dairy cows were inseminated with semen from proven dairy bulls to provide replacement heifers while the poorer producers in the herd were inseminated with semen from beef bulls. Farmers found also that the cross-bred calf had a lower birthweight than the Freisian calf and this led to easier calving for dairy heifers.

Table 1, said Dr. Hammond, gave a clear indication of the trend away from dual-purpose bulls and the demand for beef bulls for artificial insemination purposes.

The figures shown had been prepared by the English Milk Marketing Board to show the increase in the number of dairy cows artificially inseminated annually from 1951-52 to 1955-56. The percentage of cows inseminated with semen from beef bulls had

TABLE 1.

THE TREND AWAY FROM USE OF DUAL PURPOSE BULLS CONTINUES AND IN THIS CHANGE THE DEMAND FOR BEEF BULLS PLAYS AN IMPORTANT PART.

Type.	1951–52.	1952–53.	1953–54.	1954–55.	1955–56.	Per cent. of Total.	
						1951–52.	1955–56.
1	2	3	4	5	6	7	8
Dairy ..	575,283	671,806	784,021	830,589	931,966	63	58
	100	117	136	144	162	—	—
Dual Purpose	231,270	247,198	260,748	259,907	267,826	25	17
	100	107	113	112	116	—	—
Beef ..	111,983	163,008	241,520	313,384	411,255	12	25
	100	146	216	280	367	—	—
Total ..	918,536	1,082,012	1,286,289	1,403,880	1,611,047	100	100
	100	118	140	153	176		

NOTE.—The first line of figures in columns 2–6 refer to number of cows inseminated and below them is an index figure based on 1951–52 = 100.

Figures in columns 7 and 8 give the relative importance of each of the three groups in the two periods.

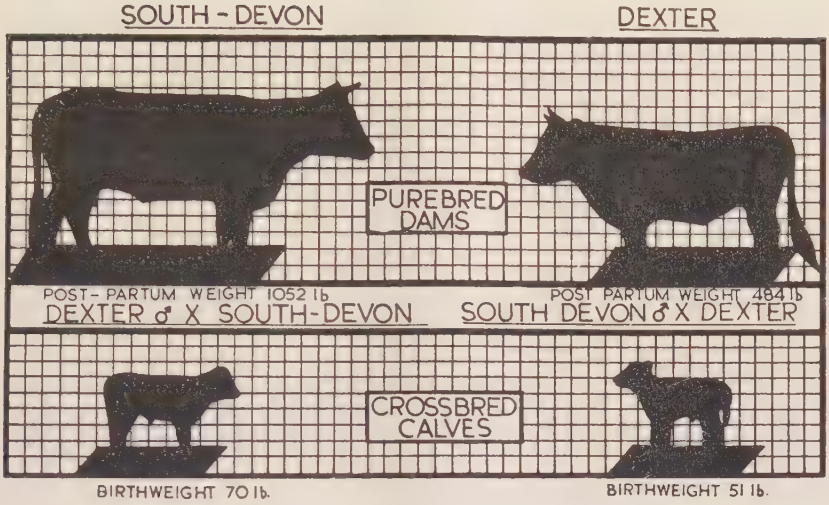

Plate 8.

The Manner in Which Size of the Calf is Influenced by Both Genetics and Nutrition.

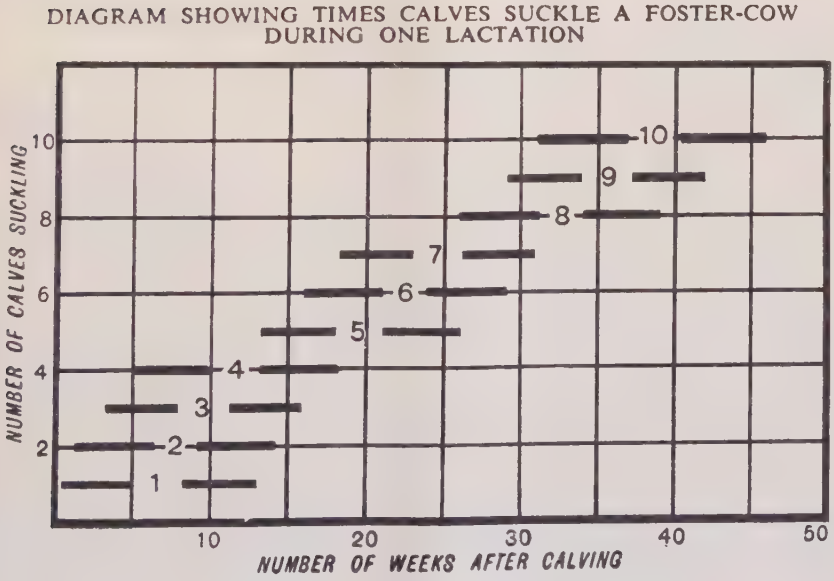

Plate 9.

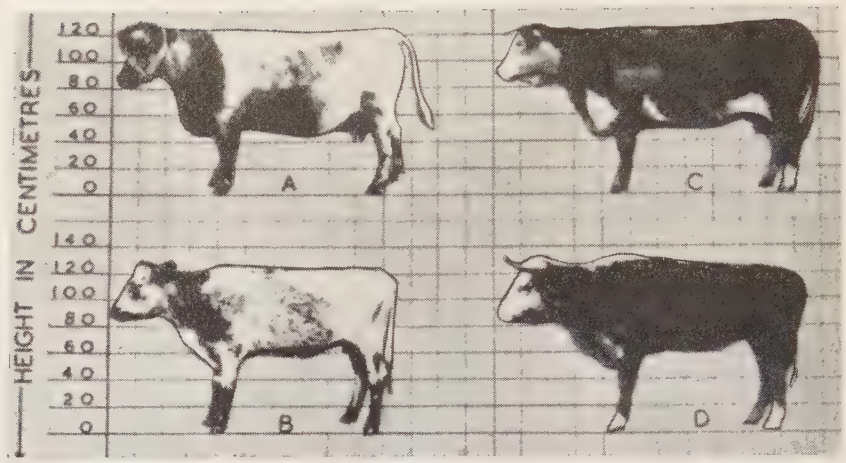

Plate 10.

Adverse Effect of Tropical Environment on the Growth of Cattle.

increased from 12 per cent. in the former period to 25 per cent. in the latter. This number was steadily increasing and would lead to an even greater production of home-grown beef in the future. The meat produced under this scheme was in high demand on the English market and Australian producers should appreciate the significance of this development.

Plate 8, said the lecturer, showed the manner in which the size of the calf was influenced by both genetics and nutrition. The cow of the largest English breed, the South Devon, produced a calf weighing about 90 lb. at birth. On the other hand the calf of the smallest breed, the Dexter, had a birthweight of about 47 lb. When these breeds were crossed the calf from the larger cow was reduced to about 70 lb., while the birthweight of the smaller dam's calf was increased slightly to about 51 lb. In the case of the larger mother the size of the calf was limited by genetics but for the calf of the smaller dam, nutrition provided through the uterus was the limiting factor. In mating beef bulls such as the Aberdeen Angus with Friesian cows, calves were obtained which had the conformation of the former breed but were very much larger. These were more profitable to the dairy-farmer under this scheme than purebred beef calves.

Multiple Suckling.

Plate 9, Dr. Hammond said, illustrated the calf rearing system of multiple suckling developed under the dairy-beef scheme. An average cow producing about 900 gal. of milk a year was given four cross-bred calves to suckle for about 90 days after the commencement of the lactation period. At the end of this time they were weaned and placed on good feed. Three more calves were then put on the cow for the second period of 90 days when they in turn were weaned. Two calves were then suckled for a similar period and finally, one calf. In this way one cow could suckle 10 calves in a year and give each of them a good start in life.

Plate 10, said Dr. Hammond, was of particular interest to Queenslanders as it showed the adverse effect of tropical environment on the growth of cattle. The top two cows (A and C) had been developed under most favourable conditions in the temperate part of South Africa, while the lower two animals (B and D) had been reared under tropical "ranching" conditions at Messina Climatological Research Station in the Transvaal, north of the Tropic of Capricorn. It could be seen that the cattle reared in the tropics were heavy shouldered and lean, with thin necks and light hindquarters. Dr. Hammond said that in the hot environment of tropical Queensland it might be necessary to select European type cattle for heat tolerance or introduce that factor with Zebu blood.

Beat The Blowfly

That sheep droppings can provide adequate food for the development of eggs inside *Lucilia cuprina,* the green primary blowfly, has been shown by trials carried out by research workers. L. G. Webber, of the Division of Entomology, C.S.I.R.O. Canberra, reports:

"Contrary to previous findings, it is shown that sheep droppings may provide adequate food for the development of blowfly eggs, especially droppings from sheep on improved pastures in spring and autumn, when both pastures and faeces have a relatively high protein content."

The female blowfly becomes adult about 5 to 7 days after emergence from the pupa. She will not lay her eggs until she has had union with a male. Her eggs will not mature unless she has had a meal of animal protein. Following mating, a meal of protein stimulates her to seek a suitable place for laying eggs. If flies are not given suitable places to lay, slow degeneration of the eggs will occur inside the fly.

This finding that sheep droppings can provide sufficient protein to permit maturing of blowfly eggs, highlights the need for routine Mules and correct tail-cutting operations. These practices, which surgically alter the sheep's breech area, remove the conditions that attract the fly. They also make conditions in the breech area unsuitable for the development of maggots.

—R. B. YOUNG, Senior Adviser in Sheep and Wool.

Care of Leather Belting.

Leather machinery belts are still giving good service on many farms, despite the increased use of rubber, canvas and balata.

The life of leather belts can be greatly prolonged if they are treated with castor oil every six months. This makes the leather supple, prevents mildew, discourages insects and vermin and reduces the tendency to slip.

Before applying the oil, clean off any accumulated dirt or belt stick with petrol and allow it to evaporate completely.

—C. G. WRAGGE, Agricultural Engineer.

Tuberculosis-Free Cattle Herds. (As at 27th November, 1958.)

Aberdeen Angus.

G. H. & H. J. Crothers, "Moorenbah," Dirranbandi
A. G. Elliott, "Ooraine," Dirranbandi
W. H. C. Mayne, "Gibraltar," Texas

A.I.S.

M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
F. B. Sullivan, "Fermanagh," Pittsworth
D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
W. Henschell, "Yarranvale," Yarranlea
Con. O'Sullivan, "Navillus" Stud, Greenmount
H. V. Littleton, "Wongelea" Stud, Hillview, Crow's Nest
J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
Sullivan Bros., "Valera" Stud, Pittsworth
Reushle Bros., "Reubydale" Stud, Ravensbourne
A. C. and C. R. Marquardt, "Cedar Valley," Wondai
A. H. Sokoll, "Sunny Crest" Stud, Wondai
W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
W. H. Thompson, "Alfa Vale," Nanango
S. R. Moore, Sunnyside, West Wooroolin
H.M. State Farm, Numinbah
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
D. G. Neale, "Grovely," Greenmount
A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
W. D. Davis, "Wamba" Stud, Chinchilla
Queensland Agricultural High School and College, Lawes
C. K. Roche, Freestone, Warwick
Mrs. K. Henry, Greenmount
D. B. Green, "Deloraine" Stud, Durong, Proston
E. Evans, Wootha, Maleny
T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
M. F. Power, "Barfield," Kapaldo
A. H. Webster, "Millievale," Derrymore
W. H. Sanderson, "Sunlit Farm," Mulgildie
R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, *via* Murgon
R. R. Radel & Sons, "Happy Valley," Coalstoun Lakes
C. A. Heading, "Wilga Plains," Maleny
G. S. and E. Mears, "Morden," M.S. 755, Toogoolawah

Ayrshire.

L. Holmes, "Benbecula," Yarranlea
J. N. Scott, "Auchen Eden," Camp Mountain
E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
T. F. Dunn, Alanbank, Gleneagle

Friesian.

C. H. Naumann, "Yarrabine" Stud, Yarraman
D. J. Pender, "Camelot," Lytton road, Lindum
S. E. G. Macdonald, "Freshfields," Marburg

Guernsey.

C. D. Holmes, "Springview," Yarraman
A. B. Fletcher, Cossart Vale, Boonah
W. H. Doss, Degilbo, *via* Biggenden
A. C. Swendson, Coolabunia, Box 26, Kingaroy
C. Scott, "Coralgrae," Din Din Road, Nanango
R. J. Wissemann, "Robnea," Headington Hill, Clifton
G. L. Johnson, "Old Cannindah," Monto
A. Ruge & Sons, Woowoonga, via Biggenden
G. Miller, Armagh Guernsey Stud, Armagh, M.S. 428, Grantham
N. H. Sanderson, "Glen Valley," Monto

Jersey.

Queensland Agricultural High School and College, Lawes
J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
J. F. Lau, "Rosallen" Jersey Stud, Goombungee
G. Harley, Hopewell, M.S. 189, Kingaroy
Toowoomba Mental Hospital, Willowburn
Farm Home for Boys, Westbrook
P. J. L. Bygrave, "The Craigan Farm," Aspley
R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
P. H. F. Gregory, "Carlton," Rosevale, *via* Rosewood
E. A. Matthews, "Yarradale," Yarraman
A. L. Semgreen, "Tecoma," Coolabunia
L. E. Meier, "Ardath" Stud, Boonah
A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
F. W. Verrall, "Coleburn," Walloon
C. Beckingham, Trouts road, Everton Park
W. E. O. Meir and Son, "Kingsford" Stud, Alberton, *via* Yatala
G. H. Ralph, "Ryecombe," Ravensbourne
Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
J. W. Carpenter, Flagstone Creek, Helidon
H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
W. S. Kirby, Tinana, Maryborough
S. A. Cramb, Bridge st., Wilsonton, *via* Toowoomba
J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
T. Nock, Dallarnil
P. Fowler & Sons, "Northlea," Coalstoun Lakes
F. Porter, Conondale
H.M. State Farm, Palen Creek
B. T. Seymour, "Upwell" Jersey Stud, Mulgeldie

Poll Hereford.

W. Maller, "Boreview," Pickanjinnie
J. H. Anderson, "Inverary," Yandilla
D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick.
E. W. G. McCamley, Eulogie Park, Dululu
Wilson and McDouall, Calliope Station, Calliope

Poll Shorthorn.

W. Leonard & Sons, Welltown, Goondiwindi

Stock Gazette

CASTRATION of boar pigs is one of the routine jobs on a pig farm and yet it is often delayed more than any other operation.

Early castration, when the piglets are three to four weeks' old, is best. The sow's milk flow reaches a peak during the third week after the birth of the litter and supplies ample high quality food to carry the piglets on without check after the operation.

Performed at the right age, castration is only a minor operation. The longer the delay, the more serious it becomes. Where older pigs are operated on there can be a serious check in growth. If the job is left until too late in life, the pig may be rejected for bacon and have to be sold as a stag at a much reduced price.

—E. L. MELVILLE,
Senior Adviser in Pig Raising.

WOOLGROWERS all over the State should be on the alert for the barber's pole worm. It's most active in late spring, summer and autumn, but builds up quickly in warm weather when there's moisture about.

By drenching your flock and using spelled paddocks, you can keep the barber's pole worm in check.

The cheapest effective drenches are bluestone-arsenic and bluestone-nicotine sulphate mixtures. However, phenothiazine is a better all-round drench, even though it's more expensive. All these preparations are readily available from suppliers of veterinary medicines, who will also tell you the correct doses and how to give them.

—A. T. BELL,
Director of Sheep Husbandry.

WINTER lighting for pullets hatched by the end of June more than pays its way.

In a recent experiment at the Rocklea Animal Husbandry Research Farm, birds under early morning light returned nearly 4s. extra profit each from March until June. Part of this profit was derived from the extra eggs laid at a time when egg prices were at their peak.

Production and food consumption of Australorp pullets under electric lights from March 1 onwards were compared with those of a similar group without lighting. The pullets were early-hatched in June, 1957.

Those under lights averaged 10 eggs more per bird than the "unlit' group from March 1 until June 30. Food consumption was not greatly increased in the groups under lights, being only 1 lb. of mash more for each bird over a period of four months.

On the basis of ruling Egg Board prices, less the cost of extra feed, there was an additional gross return of 4s. a bird in the "lit" group. Cost of electricity for the four months was 2½d. per bird. When these costs and returns are applied to a commercial flock, it will be seen that a flock of 1,000 early-hatched pullets under lights would return close to £200 extra profit during autumn and winter.

Commercial poultry farmers who have not yet installed lights could well give consideration to doing so in time for the autumn and winter of 1959.

—F. N. J. MILNE,
Senior Poultry Husbandry Officer.

Timely Tips for January

January may be the month to look to drainage and sanitation of calf pens, pig pens and bails.

Clean, well-drained pens will help control worms and diseases in pigs and calves. In and around the bails, good drainage will help you beat footrot and mastitis.

You may have to treat for worms if the season and the condition of the animals warrant it. This is in addition to your routine treatments through the year.

Watch for ticks—even on young calves.

This might be the time to get together with your neighbours to arrange with your local vet. for group Strain 19 inoculation later in the year (may be about April).

Make a new year resolution to keep breeding records of your cows. Control the bull and hand mate. If five out of the first 10 cows mated return to the bull, get veterinary advice immediately. Infertility may be starting in your herd. Early action will save a lot of trouble later.

Keep Cream Out Of The Sun

The wise dairyman keeps quality in his milk or cream by building an efficient shelter for the cans.

Cull Fowls Regularly . . . It Pays

By B. W. MOFFATT,
Adviser, Poultry Section.

EVERY day brings something new in the way of science being applied to poultry farming. With so many new scientific practices being brought into operation one is apt to overlook some of the very basic principles which are still so important to efficient poultry farming. One such practice is the ability to cull poor producers from the flock.

With the establishment of breeding schemes, and the trend towards the use of high energy rations, some people think that before long there will be no need to cull. This is far from the truth. There is little doubt that improved breeding techniques will improve the productive capacity of our birds, and better feeding practices will also assist. However, even in the best of flocks, with good feeding, there is a definite need to cull those birds which lag behind their pen mates. These birds, perhaps through bullying by other birds, or by having had an attack of disease during their rearing period, are just not producing to capacity. But they still eat their share of feed.

Feed is the biggest single item of expense on a poultry farm. Most adult birds will eat at least 4 oz. of feed a day. If in a flock of 1,000 birds there were 50 non-layers, then these birds would be costing at least 5s. per day (mash at 5d. a lb.) to keep. Such a loss cannot be tolerated these days when profit margins are not so good as a few years back.

The introduction of the laying cage system of farming has taught us much about the old established art of culling. In these cages egg production records can be kept for individual birds. The non-layers can then be easily identified. This has given us the opportunity to try our culling methods on birds of known performance. From this we have learned that although handling methods are by no means infallible, nevertheless, for all practical purposes they are quite satisfactory. Laying cages have taught us that regular culling can definitely lead to greater profit and also that there is no system of farming known that can dispense with culling.

Three Purposes.

We could divide the practice of culling into three categories:—

(*a*) Culling for age.

(*b*) Removing the obviously sick birds.

(*c*) Identifying and removing the poorer producers.

The practice of keeping birds after their first year of lay may no longer be considered profitable. Experiments have shown that second year birds will lay a third less eggs than during their first year of production. This, however, is not the full story. It has also been shown that second year birds eat much more feed to produce a dozen eggs because they have to be kept through a moult. Their death rate on occasions can be much higher. Often they lay an egg that is far too big for the usual trade. Even if lights are used on these hens to maintain their production during autumn, it has been found that the poorer shell quality

Plate 1.

Bald Heads Like this One are Usually Associated With High Production. This bird also shows the alertness of appearance of the good layer.

obtained makes them a rather doubtful proposition. For these reasons, then, the majority of birds should be culled before they go into a moult after the completion of a year's lay. The "all pullet" flock is certainly becoming popular.

Removing Sick Birds.

It is quite obvious that sick birds should be removed from the flock as soon as noticed. These birds can be treated in some cases but where no treatment is known they should be destroyed immediately so that they do not continue to consume feed and be a disease risk to the flock.

If the bird is not removed when first noticed it is usually forgotten until it dies. A good idea seen on some farms is a small coop built into the feed trolley so that the sick birds can be caught at feeding time, and taken to the cull pen. A catching hook conveniently located on the feed trolley or in a row of pens makes this job easy.

Culling Poorer Producers.

Identifying and removing the poorer producers is an art which can only be learned by experience. The beginner should practice on a few birds, keeping the culls in a separate pen to see how they perform. The job is best done by handling each bird individually. The points to look for are as follows.

Body Weight.—A good layer will always maintain good body weight. This will vary between breeds and also within a breed, but is usually over 4 lb.

General Appearance.—The bird that is alert and active is usually the good layer. She has a bright red comb and bright eye (see Plates 1 and 2). Her plumage is often dull and worn. The non-producer is the opposite of this. She often looks good because

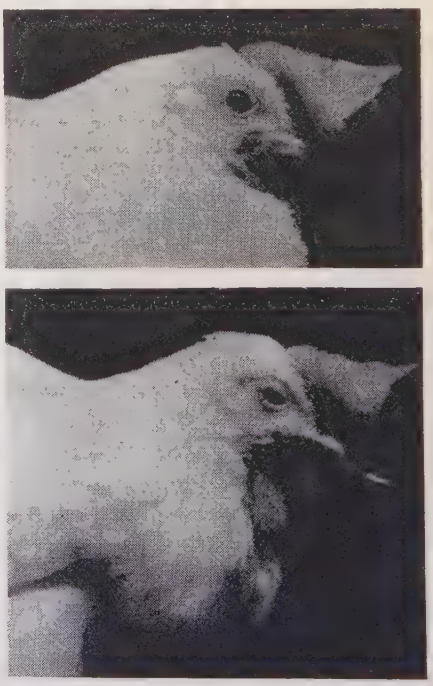

Plate 2.

Compare the Alert Appearance of the Good Layer (top) With the Dullness of the Bird Out of Production (bottom). (Both of these birds have been debeaked.)

her feathers are bright and not frayed like those of the good producer. This bird is often first to roost at night.

The Pubic Bones.—These two bones are easily felt within the abdomen of the bird near the vent. In the good layer they are usually fine and wide apart. The space between them gives a good guide as to the present state of lay of the bird. Three fingers can usually be placed between them in a good layer as shown in Plate 3, whereas in a non-producer, there may not even be room for one finger. Where only 2 fingers can be placed between these bones as in Plate 4 the bird is not in full production.

Distance Between Pubic Bone and Breast Bone.—This is often referred to as "capacity" and it is a good guide as to the rate of lay. The full width of the hand can often be placed between these bones in the good layer as shown in Plate 5, but in the poor layer they are much closer together. In Plate 6 only one finger will fit between the end of the breast bone and the pubic bones.

Softness of abdomen.—A very good guide as to whether a bird is laying is the feel of the abdomen. A very soft and pliable abdomen between the pubic bones and breast bone denotes a good layer. The poor layer is usually hard and tight with often a thick layer of fat under the skin. The state of the pubic bones and softness of abdomen can be conveniently checked at night time when the birds are perching.

Plate 3.

Three Fingers Can be Placed Between the Pubic Bones of this Hen, Showing That She is Probably Producing Eggs at a High Rate.

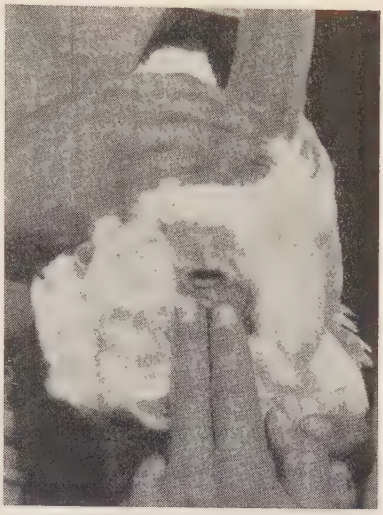

Plate 4.

In This Bird, Only Two Fingers Will Fit Between the Pubic Bones. This indicates that she is not in full production.

The Vent.—When the bird starts to lay, the vent increases in size and becomes moist, and remains large and moist whilst the bird is in production. The poor producer can be judged by its small, dry puckered vent.

Colour of Eye, Beak, and Shanks.—In some breeds, particularly White Leghorns, the colour of the eye, beak, and shanks gives some indication of the rate of lay. The colour is largely lost from these parts as the rate of production increases. However, this is not always a good guide, and it does not apply to Australorps except that the eye colour in this breed does tend to get lighter when laying is at a high rate. When examining the eye it is wise to look for the ocular form of leucosis which can be indentified by the irregular shape of the pupil.

Plate 5.

This Bird Shows "Capacity" for High Production. The full width of the hand can be placed between the end of the breast bone and the pubic bones.

Temperament.—The bird that struggles vigorously and squawks loudly when picked up is often a cull. A high producer usually has a quiet temperament, but is nevertheless alert.

Broodiness.—Birds that are frequently broody should be culled. If the incidence of broodiness in a flock is high it is often found that the same birds are broody time after time. It is a good idea to legband a bird every time it is broody and so a check can be kept of the number of times broodiness occurs.

Toe Nails or Claws.—The active bird which is usually the good layer does a lot of scratching in the litter when housed intensively or semi-intensively and thus usually keeps her toe nails short. An inactive bird often has very long toe nails.

Moulting.—The early moulters are poor producers. The best of layers often show little sign of moulting until March and then usually moult quickly. Some poor producers start to moult as early as October or November but usually moult slowly. The condition of the moult can often be determined by examining the primary wing feathers. In a "slow moulter" the feathers are "dropped" one at a time and the feathers are therefore of different ages as is shown by length and condition.

When Should We Cull?

Culling should commence from day-old onwards. In the growing stage "runts" should be eliminated. A month or so after laying commences all birds should be handled and those that do not show promise should be removed to a separate pen and held for a few weeks to see whether they develop. After this the whole flock should be handled regularly, at least every three months. In between these handlings a watch should be kept for sick birds and obvious non-producers.

From the end of September onwards culling should be very severe. Certainly a bird that won't lay in August and September should not be retained. The early moulters should be disposed of as soon as they are detected. Culling at this time of the year makes room for

Plate 6.

In the Bird Not Laying At All, Only One Finger Will Fit Between the End of the Breast Bone and the Pubic Bones.

the young replacement stock and is often necessary just to reduce overcrowding on the farm. Because of the low prices during spring and early summer the need for culling should not have to be stressed.

In the case of an "all pullet flock," layers which have been in production for most of the year should be disposed of before they moult. It is often wise to dispose of a whole pen when production drops from December onwards. In this way birds are marketed in full feather and first grade prices for carcasses are assured. If pin feathers have started to develop the bird will be down graded because of difficulty in plucking, and the resultant poor appearance of the carcass. The removal of a whole pen at a time may also be necessary to make room for pullet replacements.

Local circumstances have to be taken into account with culling. If early hatched birds have been under lights through autumn and winter many will probably go off the lay by the end of September. They should be culled rigorously from July onwards, until they are probably all disposed of by September to make room for early hatched replacements. A bad outbreak of disease such as chronic intestinal coccidiosis may also increase the need for culling. Such factors as these must be taken into consideration on the individual farm.

Easy Way to Catch Fowls.

Many farmers put off the job of culling because of the work entailed in catching the fowls. This can be made lighter by the use of catching frames. These could be described as a "set of gates" hinged together so that they can be set up to form an enclosure inside the pen, in which the birds can be more easily caught. The frames should be light so they can be carried easily and the size is governed by the dimensions of the shed. They should be large enough to enclose the full number of birds in the pen except in very large pens. Over-crowding inside the frames must be avoided or losses from smothering will occur.

The frames can be constructed in single units that can be hooked together on the spot or they can be made up of two or three units permanently hooked together. Plate 7 shows three gates permanently linked together. These are coupled so that the individual "leaves" can be moved in either direction. They are set up in the pen so as to form a square or rectangle using parts of one or two walls of the pen as sides for the enclosure. One corner is left open so

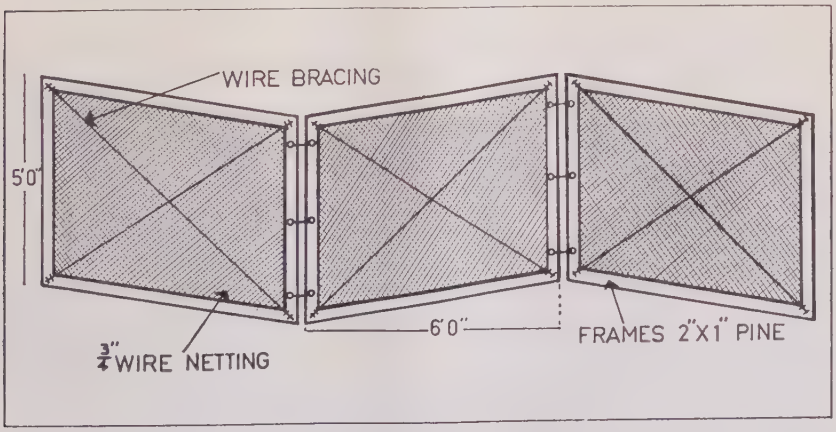

Plate 7.

Three "Leaves" of Catching Frames Permanently Hooked Together which can be used to make a Temporary Enclosure in which Fowls can be Easily Caught.

Plate 8.

A Small Enclosure within a Pen can be made by These Catching Frames. The fowls can be easily caught and handled with the minimum of labour and the least disturbance.

the birds can be driven in and then this is closed behind them. The attendant inside the enclosure can easily pick up the birds, handle them and release the good layers outside. A nearby crate can be used to hold the culls. The construction of a waist-high opening in one of the units so that the birds can be passed through to the outside will speed the job.

These frames are usually constructed of pine or "conduit" piping and covered with chain wire or heavy gauge wire netting.

The Cull Pen.

A small pen on the farm should be reserved as a cull pen. This is used to hold the culls until they are disposed of, usually to an abattoir. As this pen usually holds the worst birds on the farm it is not a good idea to make it the first pen a visitor sees when arriving at the farm. This applies particularly to a hatchery. It should, however, be placed away from other pens as it is often used to hold a number of sick birds. Another reason why it should be distant from other pens is to prevent the abattoir "pick-up" truck from coming in close contact with the main farm. This is wise from a disease point of view as birds from many other farms may be carried on the truck at the one time.

Too often birds are seen in the cull pen that are nearly dead and it is unthinkable that these should be offered for sale to an abattoir. Don't let them linger. They should be killed and burnt immediately they are noticed. They are certainly the first fowls a visitor seems to notice, and they are a reflection on farm management.

Training Your Cows

By W. D. MITCHELL,
Dairy Technologist.

"If that roan heifer plays up once more she'll end up in the saleyards."

Have you ever had cause to say this after your morning milking? If not, they are words which you have heard. They indicate that more attention could have been given to the training of young cows for the milking life which was to follow.

This heifer-training phase of dairying is important because cows are milked twice a day for possibly the next five years, with only a short break of some two to three months in dry periods. The way in which your heifers respond to milking will influence the quantity of milk they give and, more important, your own frame of mind for the next five or six years.

Let us look at how heifers can be trained satisfactorily to take their place as milking cows in the herd.

The First Steps.

One of the first steps is to get them used to the strange noises and movements associated with the milking. Yard up the springer with the herd some weeks before she calves. Let her move through the holding yard and open bails after milking, to familiarise herself with these new surroundings. A good practice just before calving is to give her a small quantity of feed in the bail and bail her up.

A few minutes of individual attention, like talking to her or massaging her udder are invaluable in her preliminary training weeks. This induction training results in a good "let-down" of milk in young animals, thus giving more milk and rapid removal of this milk.

In addition, you will find there will be no need to leg rope these cows. Also, there should be less soiling of bail floors.

Forming Habits.

It is also important to realise that cows are creatures of habit and react favourably to regular practices. Wash the udder with warm water not only to remove contaminated material but also to stimulate "let-down." The addition of chlorine to this wash water destroys the bacteria that would lower the quality of the milk.

Another valuable aid to proper cow training is to use the strip cup. As well as protecting quality, this is a valuable disease control measure. There is no need to emphasise the serious effects of mastitis in a milking herd, and the need to protect young stock from attack is of the greatest importance.

Early detection of this disease may mean the saving of several heifers from the saleyard.

There is a third important process in training young stock to the milking routine, and that is *machine stripping*. It has been proved by experiment that this method of stripping is just as satisfactory as the out-of-date technique of hand stripping. To save a lot of trouble, cows should be introduced to this method when they first commence to milk. It saves considerable time in the milking operations, reduces the risk of bacterial contamination because attention is being paid to the cups on the udder, indirectly minimises damage to the udder from cups which are left on the teats for too long.

It is important to spend some time training these few new milkers of your herd each year. Your heifers of to-day will be your milking cows for the next five or six years.

Brucellosis-Tested Swine Herds

(As at 27th November, 1958.)

Berkshire.

S. Cochrane, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
H.M. State Farm, Numinbah
G. L. Gabanko and R. H. Atkins, "Diamond Valley" Stud, Mooloolah
L. Puschmann, "Tayfeld" Stud, Taylor
C. E. Edwards, "Spring Valley" Stud, Kingaroy
V. F. Weier, "La Crescent," Clifton
N. Rosenberger, "Nevrose," Wyreema
L. P. Orange, "Hillview," Flagstone Creek
B. Osborne and Dr. J. W. Best, Miltown Stud Piggery, Warwick
W. Young, Kybong, via Gympie
E. J. Clarke, Mt. Alford, *via* Boonah
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
E. R. Kimber, Block 11, Mundubbera
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
J. W. Bukowski, "Secreto" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
D. Ludwig, Cainable, via Beaudesert

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood.
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood.
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajea" Stud, Cabarlah
H. L. Larsen, "Oakway," Kingaroy
A. Palmer, "Remlap," Greenmount
G. I. Skyring, "Bellwood" Stud, *via* Pomona
G. Pampling, Watch Box road, Goomeri
M. Hall, "Milena" Stud, D'Aguilar
K. B. Jones, "Cefn" Stud, Pilton road, Clifton
Barron Bros., "Chiltern Hill," Cooyar
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook
P. L. and M. T. D. Hansen, "Regal" Stud, Oaklands, Rangeville, Toowoomba.
D. Ludwig, Cainable, via Beaudesert
J. C. Lees, "Bridge View" Stud, Yandina
R. Rhodie, Clifton
C. Assenbruck, Mundubbera
A. J. Mack, Mundubbera
J & S. Kahler, East Nanango
C. P. Duncan, "Hillview," Flagstone Creek

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale" Stud, 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville
A. J. Mack, Mundubbera
J. Ashwell, "Greenhill," Felton South

Large Black.

E. Pointon, Goomburra

Dairy Parade

A DAIRYMAN asks this question: "As a cream supplier I invariably received choice grade, and I am confident that my milking machines are clean. I now supply milk, but my milk often fails to pass the qualifying test. What can I do to make the milk pass"

In a nutshell the answer is boiling water—really bubbling, boiling water. To get this water it is necessary to switch an electric boiler to "boost" when you start milking. Use boiling water as the last rinse through the machines night and morning.

This boiling water kills the milk-souring bacteria which otherwise multiply even in clean machines. These bacteria are not important when supplying cream because even choice cream before being pasteurised can contain in actual fact millions of bacteria per cubic centimetre.

In milk, however, more than a few thousand souring bacteria per cubic centimetre will cause the milk to fail the qualifying test.

When supplying milk, therefore, the routine is to use cold water first, hot detergent second, and boiling water last. Then open up the plant and let the parts dry.

—J. CALEY,
Dairy Technologist.

DAIRYMEN often ask: "What are thermoduric bacteria, and why are they so detrimental to liquid milk?" The word "thermoduric" means simply, when applied to bacteria, heat resistant.

Being heat resistant they are not killed by milk pasteurisation temperatures. This is the reason that they are so detrimental to liquid milk.

What makes them heat resistant? They extract protein from improperly cleaned milking machines and utensils and make protective coverings like cocoons around themselves. This "armour" of protein saves the bacteria from being killed during the pasteurisation process.

They sound very formidable bacteria, don't they? *But remember, they can easily be eradicated from your milk supply by correct cleansing and sterilization procedures in the dairy.*

Thermoduric bacteria are usually associated with milk-soiled dairy utensils. Careless methods of cleansing and sterilizing will result in a "build-up" of these bacteria. So, to obtain a low thermoduric count of your milk follow these recommendations:

After *each* milking use plenty of hot detergent water (to which is added a wetting agent) for the cleansing of machines, cans and utensils. Then sterilize your equipment with boiling water or steam. Although heat resistant, thermodurics cannot withstand boiling water or steam sterilization temperatures.

Remove any traces of milkstone or waterstone from equipment, using approved acids. These stone deposits are an ideal breeding ground for thermoduric bacteria.

And finally, keep your equipment in good repair. It is extremely difficult to cleanse and sterilize badly pitted and neglected dairy utensils. Bacteria lodge in cracks and crevices and defy all methods to remove them. These bacteria "seed" the milk as it flows over the utensils.

Cracked and perished rubberware also harbour millions of bacteria.

When you see your rubbers in this condition, all you can do is replace them with new ones.

You may say to yourself—"Why should I worry about thermoduric bacteria—my milk is all qualified at the factory?" If this is the case you may be suffering from a sense of false security, because thermoduric bacteria have no effect on the methylene blue test. Thus you can be getting all qualified milk and still have a high thermoduric count.

It is the duty of liquid milk producers to eradicate thermoduric bacteria from their supply and comply with Regulation 182, Section 2 of the Dairy Produce Acts which states that pasteurised milk shall not contain more than 50,000 bacteria per millilitre.

—*M. COCKBURN,*
Dairy Adviser.

THE amount of fat in milk is of interest to many people. The consumer regards it as an indication of "richness," the nutritionist as one measure of food value. The farmer is interested where milk is paid for according to fat content because his income depends on the fat test.

It is therefore important for milk to be tested accurately. Moveover, the most meticulous care in testing is useless without correct sampling. It is like shutting the gate after the horse has got out. The analysis is only as good as the sample.

Sampling milk is not easy, because the cream starts to rise after a few minutes' standing. It is essential to mix the cream thoroughly through the milk, either by pouring from the full can into an empty one and back again three times, or by stirring vigorously up and down with a proper stirrer. It is ineffective to attempt to stir a can with something like a wooden spoon.

Having stirred the milk, fill the sample bottle without delay and fill it completely. This complete filling is to prevent the shaking during transport from churning the fat into butter.

When taking one sample from two or more cans there is another consideration, namely the amount of sample to take from each can. The rule is to take the sample in proportion to the amount of milk in the can, which means you would take half as much from half a can as you would from a full can, and so on.

So to sample a number of cans of milk for a fat test, first mix the milk by stirring with a proper stirrer or by pouring into another can and back three times, then dip out in proportion to the amount of milk in each can, mixing together what you dip out in a mug, then fill the sample bottle completely to stop churning of the fat during transport. This will give a sample which can be tested with confidence.

—*J. CALEY,*
Dairy Technologist.

Plan Now For January

Repair roofs and tanks to catch all available rainwater for cleaning operations.

Destroy flies and breeding grounds and protect milk quality.

Keep all dairy equipment clean and sterile.

The St. Andrew's Bean

By L. G. TRIM,
Adviser in Horticulture.

ST. Andrew's, a well-known variety of French bean, has many adherents in the Gympie district, which specialises in the production of winter beans for southern markets. Elsewhere in Queensland, it is grown only on a limited scale.

The history of the variety is somewhat obscure, but it is known to be a selection from Masterpiece, which was at one time popular in the British Isles.

Several strains of St. Andrew's are grown at Gympie. The best of these is known locally as Schultz's St. Andrew's but other strains have been derived from grower selections in crops grown from seed imported from South Africa about 1950. The results obtained with the imported seed were very mixed. However, some plants showed desirable characteristics and the seed saved from them provided the better strains now grown on a commercial scale.

Plate 1.

French Bean Crop near Nambour. The crop is grown on frost-free slopes during the autumn, winter and spring months. The variety St. Andrew's is liked at Gympie for its ability to yield well on the less fertile soils.

What Is Required.

Before a new variety or strain becomes firmly established in the bean industry, it must not only thrive in the district but also be acceptable to the market and the buying public.

From the grower's viewpoint, the plant required for commercial production should have a medium-sized bush and carry its crop well clear of the ground. It must also be able to withstand strong winds and heavy rain during the growing period.

The flowering and pod-setting period should preferably be short so that the entire crop can be harvested in no more than four or five picks at intervals of two or three days. In addition, the pods should, for ease of picking, be clustered together and not spread over the plant.

The main requirements in a French bean variety so far as pod quality is concerned, are:—

Keeping Quality—Pods which shrivel and lose weight quickly after harvesting are seldom attractive when consigned to distant markets and offered for sale. Shrivelling is, to some extent, associated with lack of fibre; a moderate amount of fibre in the pod is therefore desirable.

Good Colour—Dark-green pods which retain their colour after harvesting sell better than pale-green or "bleached" pods.

Evenness in Shape—Nearly straight pods are relatively easy to pack and the consignment opens up well on the market floor.

Characteristics.

The St. Andrew's bean is an erect plant when young but somewhat spreading in the later stages of growth. It tends to produce a large proportion of its crop on lateral branches well out from the centre of the plant. With this type of bush, pickers are apt to damage branchlets which carry a number of immature pods. Careful picking is therefore necessary.

Although the St. Andrew's crops heavily, the plant flowers over a longer period than Brown Beauty—the main variety grown in Queensland—and harvesting extends over a longer period. Generally, six to eight picks are made.

The period from planting to harvesting varies with weather conditions. Crops which are planted in late March are generally ready to pick about seven weeks after germination. However, growth is slower in later plantings and the period from germination to harvesting is much longer.

In the Gympie district, the St. Andrew's bean appears to be less susceptible to low temperatures during the flowering and pod-setting period than some other varieties. Cropping is therefore more consistent during the winter months.

Pod colour in the St. Andrew's bean is generally a lighter-green than that of Brown Beauty. The pods also tend to lose colour more quickly in transit to distant markets.

The pods are fleshy and long (up to 7½ in.). In commercial strains they are usually slender and narrow but this is not the case in the strains grown at Gympie. Here, they are fairly broad (¾ in. in width), straight to slightly curved in shape with, usually, 6 seeds which are oval in cross section. One characteristic of the pods produced by vigorous plants is the dimple between adjacent seeds: this is commonly known as the St. Andrew dimple.

The pods will retain their quality on the plant a day or two longer than those of Brown Beauty, and this is an advantage when low market returns do not justify "close" picking.

Plate 2.

Bean Variety Trial. In trials such as this, the performance of varieties and strains is tested from year to year in all the more important bean growing districts.

As the pods are fairly straight and flattish, there is no difficulty in packing St. Andrew's beans in cases of standard weight. At times, growers pack too heavy a case.

The seed of the St. Andrew bean is fairly large, oval in cross section, rounded at the ends and kidney shaped. The colour is light buff when fresh but darkens with age. It has a distinct broad "eye-ring" which is light-brown nearest the hilum (point of attachment of seed stalk) and dark purple on the outer edge.

Soil Requirements.

Although there are exceptions to the rule, the St. Andrew's bean appears to produce better crops than Brown Beauty on the less fertile soils. Conversely, where soil texture and nutrient status are average or above-average, Brown Beauty is the preferred variety at Gympie. This is particularly noticeable on the fertile red clay-loams of the Mary Valley.

The St. Andrew's bean differs from Brown Beauty in its reaction to certain diseases which affect the bean crop.

St. Andrew's is more susceptible to rust disease than Brown Beauty. This disease mainly attacks the leaves; blemishes in pods picked at the right stage of maturity are normally of minor importance. However, during the past year or two, the pods have sometimes been affected to such an extent as to render them unmarketable.

On the other hand, the St. Andrew's bean has some resistance to bacterial blights.

Green Fingers

BECAUSE pineapples need a well-drained soil, it's often best to establish the crop on raised beds. On these beds, the plants develop a strong root system, and in wet weather excess water drains into the inter-row furrow and away from the plantation.

The raised beds are spaced at approximately 6 ft., measured from the centres, and carry double rows. Each is thrown up with the plough and, before planting, smoothed down with a rake or a trailing weatherboard attached to the tractor. Adjacent mounds are separated by a furrow about 6 in. deep.

Hilling an established pineapple crop involves trimming the lower and outer leaves from the plants, and then ploughing a furrow on each side of the plant row so that the soil is thrown up into the base of the plants. The loose soil is worked into the double row with a hand hoe.

—*L. G. TRIM,*
Adviser in Horticulture.

MELON crops are greatly reduced by constant, deep cultivation and by poor irrigation methods.

Cultivation should be just deep enough to destroy the weeds and break the surface crust of the soil. Deep cultivation injures the roots and gives the crop a setback. Take care not to damage the vine; stems are easily damaged and young fruit become unmarketable if scarred or malformed.

Melons, like all vine crops, need plenty of water, particularly during germination, early stages of growth and fruit setting. As a general rule, water your melons about once a fortnight until the plants meet in the rows. After that, irrigate as required. Stress signs are usually poor colour and a wilted appearance of the stem tips, Avoid over-watering, or the leaves and fruit may be severely damaged by fungal diseases.

—*S. J. KUSKIE,*
Adviser in Horticulture.

CITRUS trees require a fair amount of water to produce a good crop of fruit—more than is often appreciated by some citrus growers.

In north Queensland, there is no doubt that citrus orchards benefit greatly from periodic applications of water. Many of you have sizable irrigation outfits for the purpose. But are you making the best use of them?

Of course it costs money to irrigate even if the water is free. You have your pumping costs and value of time spent on the job. But an adequate amount of water applied at certain critical times will increase the crop, or hold it on the trees. If the market price is at all reasonable, you'll soon be compensated for the cost of irrigating.

One of the main times to see that your soil is not lacking moisture is when the trees are flowering. If the trees lack water, as they did last year, a high proportion of fruit which is set will drop off. So then, irrigating at flowering time can quite easily double the crop set.

That is assuming, of course, that the trees are otherwise healthy and well fertilized. Irrigating will help to give results from the fertilizer too.

After the fruit is set, the trees need regular watering to hold it. It is not suggested that you always apply the full requirements of the tree, but it would be worth your while to apply sufficient water to hold the crop.

This might mean only one good watering a month, or it might mean more, depending upon the weather and your particular soil type. You would have to be guided by the appearance of the trees and the feel of the soil.

If the trees lack water, the leaves curl and the fruit will fall easily when touched.

Soils, particularly grey soils, often look wetter than they are. It is well to know that a tree cannot take up all the moisture in the soil; some always remains on the soil particles. Thus, a soil might appear moist, by virtue of its colour, but still contain very little water available to plants.

It is better to judge the moisture content of a soil by feel, rather than by sight. A soil might look moist, but if you can't feel the moisture, then there isn't much there of any use to the plants.

If you dig into the root zone, say about six inches down, and you can't feel moisture in the soil, your trees need watering.

How much water to apply at each time of irrigation is the most important question.

It can't be accurately expressed in inches. It is better to say that the soil should be thoroughly wetted to the depth of the root zone.

This means that each time you irrigate you apply sufficient water to penetrate the soil to the depth where it is already quite moist. Now this is a very important point, and one often overlooked.

Quite often, when the top soil is wet and water is lying around in pools, the irrigator turns the water off, yet there is still not enough there to penetrate to the full depth of the root zone. There may appear to be a lot of water lying about, but this might be due to the low infiltration rate of the soil.

When all the water has disappeared, it might be found that only the top few inches of soil are wet and the soil underneath is dry. The top soil moisture is held there and won't go any deeper. Consequently, it is all lost through evaporation within a few days, and the value of the irrigation is practically nil. Yet if twice the amount of water had been applied, a full-depth penetration could have been obtained, with positive results.

The thing to remember is that it might take an inch of water to wet the dry top soil to a depth of two inches, but another inch may wet the soil a further four or five inches. Then, if the soil is reasonably damp at this depth, another inch will provide plenty of free water thoughout the root zone. This might be sufficient to keep citrus trees going for a month or so, whereas a light watering is practically useless.

Keeping this in mind, it is a very good idea to follow up light rains with irrigation. A light storm, for instance, might have just wet the surface. In a few days all the moisture is lost. Well, why not irrigate immediately after the rains? You would get a quick penetration of useful water and would save on irrigation expense.

—L. J. MISSINGHAM,
Adviser in Horticulture.

MANY citrus growers include zinc sulphate with the blossom spray to correct zinc deficiency in their trees. It has recently been brought to the notice of the Department of Agriculture and Stock that difficulties have occurred in the preparation of this mixture.

If zinc sulphate is being used in a separate spray it may be neutralised with caustic soda, soda ash or hydrated lime to prevent injury to the trees. If it is being mixed with a copper fungicidal spray, however, only caustic soda should be used for this purpose.

Also, the copper preparation should be added to the vat *after* the zinc sulphate and caustic soda have been dissolved in the water.

When soda ash or hydrated lime are used, the copper will quickly settle out of suspension. Even with agitation in the spray vat the efficiency of the spray may be seriously affected.

Four and a-half oz. of good quality caustic soda should be added for each pound of zinc sulphate. White oil (1-160) should also be added to ensure maximum disease control.

To Combat Bracken Fern And Blady Grass

Question: "D.A.," of Mooloolah, has inquired about the use of African Star grass and Para grass in combating bracken fern and blady grass on sandy loam. He tried Guinea and molasses grasses for this purpose and has been disappointed with the results.

Answer: Guinea grass is not likely to be satisfactory in combating bracken fern and blady grass. Molasses grass, however, has been very useful for this purpose. In the Cooroy district, the Department has had success in controlling bracken fern, blady grass and other scrub pests with molasses grass. Careful management is necessary to ensure the development of a good stand of molasses grass. Heavy or continued grazing is detrimental, and fire is liable to cause severe injury to the grass.

Para is a nutritious and palatable grass and produces its best bulk when grown on an area not subject to long, dry spells. It does not need to be grown over water, though moist situations are quite suitable.

African star grass has been used on the Darling Downs on soil conservation projects for gully reclamation and as a waterway-covering grass. Care should be exercised when grazing this grass as it contains a cyanide-producing compound. Stock-grazing trials have not shown it to be dangerous though such a possibility should not be ignored. Do not graze African Star grass for long periods at a time; this will help reduce the possibility of stock poisoning from eating this grass.

Sowing such legumes as Centro and Townsville lucerne with the grasses mentioned is recommended. The seed should be treated with the correct inoculum prior to sowing. These two legumes when established will improve the nutritional level of the pasture and help in combating bracken fern and blady grass.

It is worthwhile fertilizing a small strip of the pasture with a 50-50 ammonium sulphate, superphosphate mixture, at the rate of 1 or 2 bags to to the acre. A marked response in pasture growth can be expected during the summer months, when suitable soil moisture conditions are present.

Mutton And Lamb Cuts For The Housewife

By A. A. SEAWRIGHT,
Divisional Veterinary Officer (Slaughtering).

In Queensland the majority of mutton and lamb carcasses are of the Merino and Merino cross-bred types. In the future, with the gradually expanding fat lamb industry, more and better types of mutton and lamb carcasses should be available to the meat trade in this State.

Lamb and mutton carcasses in good shop trade condition have a covering of hard, white fat which protects them from shrinkage and gives them an attractive, clean-cut appearance.

It is standard meat trade practice for lamb and mutton carcasses to be delivered from the meat market to the butcher's shop in the dressed carcass form. In the retail shop the usual procedure is for the butcher to saw the carcass through the centre of the backbone into two almost identical sides.

Plate 2 shows a side of lamb hanging in the shop. The firm, even covering of fat on the surface of the carcass is apparent. In this particular side, the neck has been sawn off and the sites of the shoulder, loin and leg cuts are indicated by means of the appropriate tickets.

The First Cuts.

In Plate 3 the first cuts of the lamb or mutton carcass are shown.

In breaking down a side of lamb, the leg is usually removed first. The butcher feels for the hip bone and, with the aid of knife and saw, cuts through the side perpendicular to the length of the carcass and so that a small part of the hip bone is left remaining on the leg. This is done so that the leg will continue to retain its shape. The shoulder is next removed, as in Plate 3. A circular cut is made with the knife right down to the ribs and the shoulder comes away readily (Plate 3).

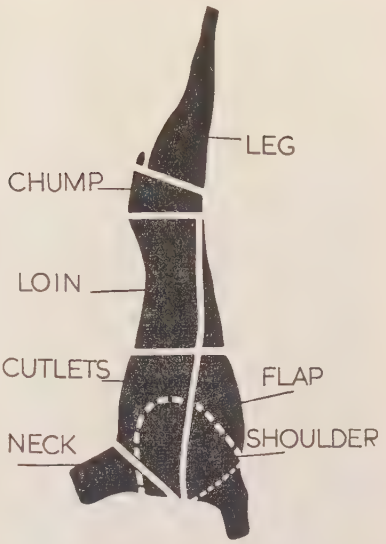

Plate 1: **Outline of The Lamb Carcass, Giving an Indication As To Where The Cuts Referred To May Be Located.**

Both shoulders and legs of mutton and lamb are very popular roasting cuts. In the case of mutton, legs are often pumped with curing mixture and sold as corned legs. In Plate 3 (1) this leg is a full leg of mutton and consists of the leg proper or butt and the end of loin or chump. Inclusion of the chump in this cut makes the cut too large for some purchasers and they prefer the leg cut with chump removed. The chump is of excellent eating quality and may be cut into chops for grilling or baked whole as a roast joint. Both mutton and lamb shoulders are frequently boned, cut and rolled and tied up with twine and sold as rolled shoulder of mutton or lamb as the case may be.

That portion of the side of lamb as in Plate 3 (3) is broken up into chops, some of which are best suited for grilling and others better for stewing. Plate 4 shows the nature and types of chops that may be prepared from this middle part of the lamb side.

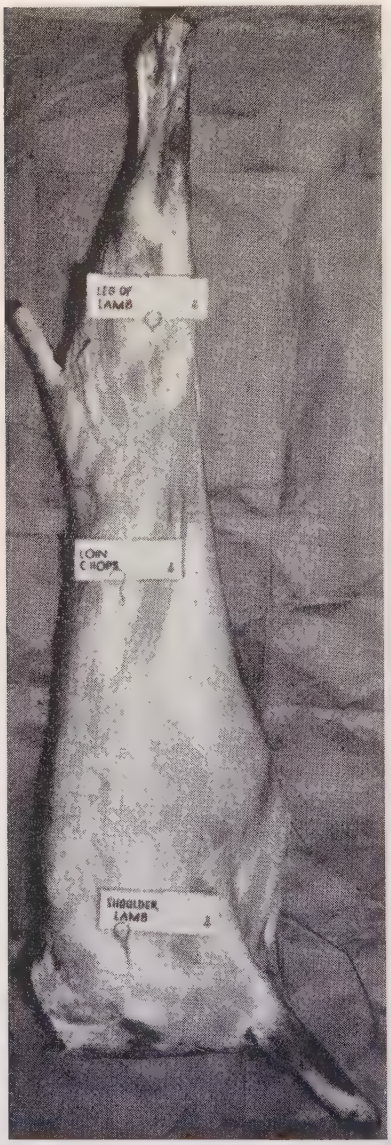

Plate 2.

A Side of Lamb, Showing Positions From Which the Principal Cuts, Leg, Loin Chops and Shoulder are Derived.

Retail Cuts.

In this particular case, the lamb side was broken up into retail cuts by the use of the bandsaw, a machine frequently found in butchers' shops these days. First, the flap is removed from the middle and this cut consists of the flank and bricket.

Often the flaps are pickled and sold as corned flaps and frequently they are merely stewed or roasted with the bones left in.

By means of the band saw, the remaining portion may be cut entirely into chops. The butcher usually begins at the loin end and the first six or so chops that come away from the saw are the short loin chops.

The short loin chops are those in Plate 4 (2) marked "a." It will be noted that these chops have a short tail, a large oval eye of lean meat, a "T" shaped piece of bone at the large end and a small eye of undercut against the other side of the "T" shaped bone.

It will be noticed how pale the eye of the undercut is compared with that of the large eye of meat nearest the outer edge of the cut. These chops have an even covering of smooth, white fat of optimum thickness.

The next chops to be sawn off are simply the loin chops, and these chops will contain the short floating rib bones. These chops are noted for their long tail. A typical loin chop of this kind is the chop marked "b" in Plate 4 (2).

It will be noted that the eye has become somewhat shorter and smaller than the eye of meat in the short loin chops and the bone is not "T" shaped as in the latter chops. Gradually as the chops are cut from loin to ribs the eye of the undercut of the loin gradually becomes smaller until it disappears. These chops are excellent grilling or stewing chops.

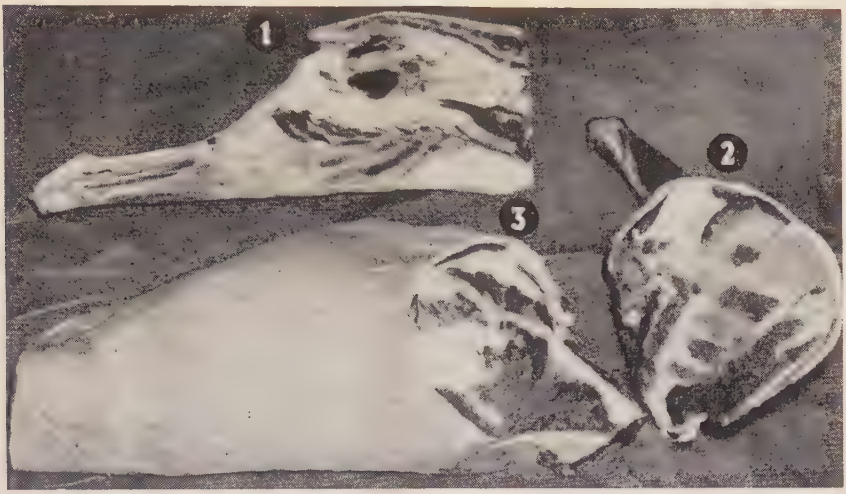

Plate 3.

The First Cuts of a Side of Lamb. (1) Full leg of lamb; (2) shoulder of lamb; (3) remainder of side from which cuts in Plate 4 are prepared.

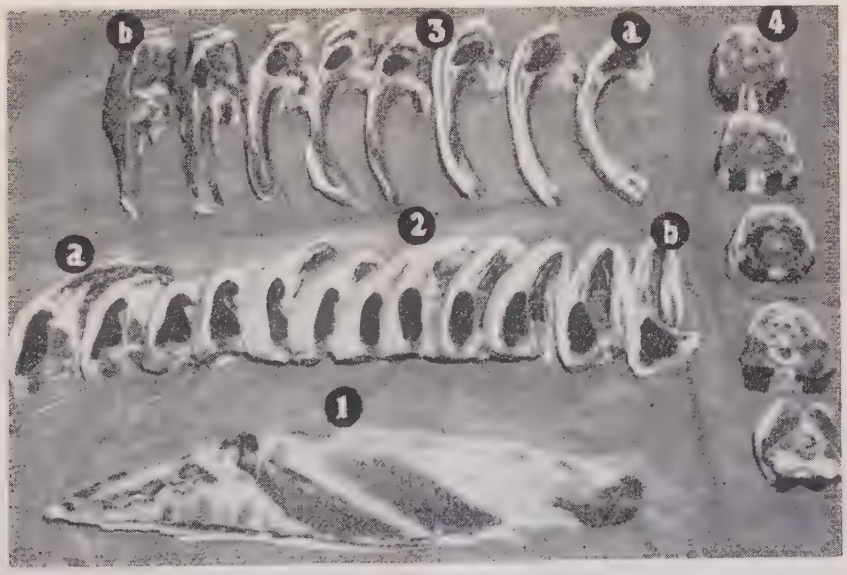

Plate 4.

Chops Cut From the Side of Lamb. (1) Flap; (2) loin chops; (3) cutlets; (4) neck chops.

The next chops to be cut are those shown in Plate 4 (3). These are the cutlets and always contain fixed rib bones. These chops vary in shape from that shown at "a" to that at "b." The cutlet marked "a" is not unlike the loin chop at (2) "b" but in the cutlet, the rib bone is continued right throughout the tail of the chop. The cutlet marked "b" is that one nearest the neck and the chops are noted for their meaty qualities, as shown in the photograph.

It will be noted that these latter chops do not have an outside covering of fat as they are cut from the region of the shoulder and, as mentioned, the shoulder is removed and the selvage is removed with it.

These cutlets are often very popular as they contain a high proportion of lean to bone. However, the lean meat in these cutlets of type "b" is not regarded as being so tender and tasty as in the case of the loin and short loin chops.

It will be noted that the cutlets are characterised by the same eye of lean meat as in the loin chops, but in the cutlets there is an additional strip of lean between the eye and the exterior fat covering (where this is present). Loin chops do not have this strip of lean on the outer edge of the lean eye of the chop.

Before the widespread use of the bandsaw in retail butchers' shops, the neck of mutton was sold as soup bones. Now, the neck may be run through the saw and cut into chops as are shown in Plate 4 (4). It will be noticed how meaty these small round chops appear and they continue to find a ready market as chops for stewing purposes.

Almost the whole of the dressed carcass of the lamb or sheep may be sold across the butcher's counter and the carcass in general is of such a convenient size that even legs and shoulders may be sold separately cut into leg and shoulder chops respectively.

A few shillings may save you pounds

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for the junior farmer

by J. PARK,
State Organiser,
Queensland Junior Farmers' Organisation.

The Member. No club, however efficient its officers may be, can be a good club unless it has the willing and energetic support of the members. Everyone has his part to play and his responsibilities to shoulder, and these cannot be avoided merely by electing a committee and officers. Members should take part in the work that they themselves chose when they helped to draw up the programme, and the officers and leader must be made to feel that help with their duties will be willingly given whenever it is needed. The treasurer is helped if subscriptions are paid as soon as they are due. The task of the secretary is made lighter if his letters are answered, and his notices read. The chairman is able to steer the meeting more easily if everybody understands how the business is done. These are just a few of the ways in which the "ordinary" member can help.

Meetings. When we join a club we take on, voluntarily, certain duties towards our fellow members. Club meetings, therefore, should be attended as regularly as possible. When it is quite impossible to be present, an apology for absence should be sent to the secretary in advance of the meeting, or offered on the absent member's behalf at the appropriate time during the meeting. All members should arrive punctually, and meetings scheduled to begin at 8 o'clock should not be opened at 8.20 o'clock.

If the business of the meeting has been announced in advance (all members should receive a Notice of Meeting Card), the members should think about it beforehand. If possible, the agenda should be studied in detail before the meeting starts. It is then more likely that thought and speech will be intelligently, and therefore usefully, directed to the business in hand.

The simple rules of debate, which are a part of the rules for the conduct of meetings, should be learnt. Common sense has made these what they are, and they must be followed if we are to enjoy the meeting and make it useful. Once these rules have been learnt, every meeting gives us an opportunity to turn them to good use. Every member can set an example of reasonable conduct, but this needs practice as well as a desire to do right.

For example, there is often the temptation to exchange whispered remarks while the meeting is in progress. Although this is sometimes necessary when the remark bears on the matter under discussion, it should be avoided whenever possible, for it interferes with other people and makes them uncomfortable. Good manners are usually based on good sense and fair treatment of others.

We ought to be ready to take part in the discussion if there is something worthwhile to be said, and we should not wait until the meeting is over to start talking. If there is criticism to be made it should be made at the proper time in the meeting, and not in private laughter or grumbles afterwards. On the other hand, we must pay the other members the compliment of speaking only if there is something interesting and useful to be said, and not merely for the sake of saying something. When speaking, do not wander but come quickly to the point,

and keep to it. Time and effort are often wasted by members who do not understand thoroughly what is being discussed, and who, therefore, talk "off the point" when they get up to speak.

When a member gets up in the body of the meeting to speak he must, as is well known, "address the chair". This means that he speaks to the chairman, and to no one else. Therefore, he prefaces his remarks with the words: "Mr. Chairman". He must not add "Ladies and Gentlemen", because he is addressing "the chair" and not the meeting. Only those who have been invited to address the members, which they will probably do from the platform, should start with the words: "Mr. Chairman, ladies and gentlemen".

When a member is proposing a resolution, or an amendment, that is not a perfectly simple one, he should put it in writing and hand it to the chairman. It is most important that the exact wording of a motion should be clearly understood.

The duties of a chairman are made easier if the members know what these duties are, for it is then possible for them to co-operate. This co-operation is necessary if the business of the meeting is to be dispatched speedily. An understanding of the chairman's job also makes it easier to accept his ruling cheerfully, even if we think he is mistaken. In such a case, a few quiet words in private after the meeting may more effectively clear up a misunderstanding, than publicly disagreeing with the chairman's ruling.

A Vote of Thanks. Any member may, at some time or another, have to propose or second a vote of thanks to a speaker. If the usual, conventional phrases (cliches) are avoided the thanks will sound more sincere. Reference can be made to those points in the talk that were of special and personal interest, and this is a particularly useful line to follow if the talk as a whole has not been very interesting. However dull it may have been there are certain to be bright spots, and to mention these in an appreciative way will show that one is genuinely grateful to the speaker for having taken time and trouble.

The seconding of a vote of thanks is the most difficult of all such tasks, for the proposer, or mover, will probably have taken the best bits. The seconder should make notes, as the talk proceeds, of any points that take his fancy and that he thinks may not attract the attention of the proposer.

Both proposer and seconder should make a note beforehand of the speaker's name and position, for they may be forgotten in an anxious moment. Although it is a sound general rule to avoid the use of cliches, both proposer and seconder can end their short speeches with some such formal words as: "I have pleasure in proposing (seconding) this vote of thanks." Never finish by saying "I don't think that there is anything else I can say." Your audience will probably be well aware of the fact if it becomes necessary to do so.

Ideas worth trying. Each month we shall print suggestions for adding variety to club programmes. In doing so we shall have in mind the social as well as the technical aspects on training.

Kingaroy Club has sponsored weekly Judo classes. Members not only find the activity useful and enjoyable, but they are finding that the ethical teachings of Judo are well worth applying to daily life.

Colour photography with 35 mm. cameras has become so universally popular, and is proving such a boon for members who have to "give a talk", that several clubs have purchased slide projectors. The latest club to start a "slide projector fund" is the recently formed one at Roseneath.

Have A Care For Your Heart

NONE of today's scientific marvels is so remarkable as the heart. It has been calculated that in a lifetime, without any rest or overhaul, the heart completes 10 times as many operations as does a car which has travelled 50,000 miles!

Yet many people abuse their hearts beyond even this miraculous organ's tremendous reserve, and so hasten an untimely end.

What then can we do to prevent the heart's failing before life's full span?

Regular medical check-ups are by far the greatest preventive step, because heart deterioration can be insidious and advance considerably without marked warning. Yet a heart condition in its early stages can be discovered by a doctor in course of a routine examination.

Contrary to common belief, much can be done in the early stages to prevent or at least to minimise the development of heart disease.

Practise Moderation.

Amongst the heart's worst enemies is constant physical and nervous tension. The cultivated habit of relaxing the tension at frequent intervals is a great lifesaver.

Moderation in eating and drinking, and adequate sleep and rest are also valuable ways of protecting the heart.

After the age of forty, sudden and violent exertion and prolonged physical effort are unwise. This is especially so in the case of the person who has not kept in good condition by regular exercise.

Avoid Overweight.

Overweight increases the work of the heart, usually at a time when its capacity for work is growing less. Among persons subject to high blood pressure, the fat ones are usually more likely to develop heart disease than the lean ones.

If, in the course of your regular medical examination, your doctor tells you that you are overweight, let him be your guide, in a weight reduction plan.

What Are The Warnings?

There are very few characteristic symptoms. Many feelings of discomfort blamed on the heart are caused by a disturbance somewhere else in the body, or by worry or nervousness.

However, though they often do not mean heart disease the following should always be reported to a doctor:—

PALPITATION. But remember that irregular beating of the heart is a common sensation in nervous persons with healthy hearts as well as in persons with heart trouble.

SHORTNESS OF BREATH. When associated with slight exertion, shortness of breath may be a sign of heart disease. But note again that it is also common in many other troubles.

SWELLING OF FEET AND ANKLES. This another early sign of possible heart weakness.

A PAINFUL, STRANGLING, OPPRESSIVE SENSATION UNDER THE BREASTBONE. Frequently radiating down the arms, and brought on by exertion or emotion, this may be angina pectoris.

Most Important.

If you think you may have heart disease, see your doctor. If after a careful examination, he says your heart is sound, *BELIEVE HIM.* If he tells you that you have any form of heart disease, *DO AS HE SAYS.*

BY CAREFULLY FOLLOWING THEIR DOCTORS' INSTRUCTIONS, many people with heart disease live long and useful lives.

—Contributed by Queensland Health Education Council.

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